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Editorial Notes

Coke Marketing

COMMENTING in these columns last week on the Paper given by Mr. G. M. Gill to the Wales and Monmouthshire Association of Gas Engineers and Managers, we called attention to the Author's experience of how small undertakings are handling coke sales. He has found that the policy pursued by some undertakings leaves room for a good deal of improvement. It is essential these days that gas undertakings, large or small, should supply coke properly graded for the particular uses to which it is to be put. Yet in numerous gas-works even to-day no provision is made for grading coke —and this in spite of the fact that in the future more oven coke will be put on the domestic market. As Lord Ridley observed in his recent Presidential Address to the Society of British Gas Industries, the domestic coke market was never the close preserve of the Gas Industry, and it is only within the last dozen years or so that it has been at all actively cultivated, and then it has been left largely to the London gas undertakings and the L.C.C.A. The provincial gas undertakings, with certain notable exceptions, have until recently done nothing more to foster the market than have several of the coke oven concerns. It is at least twelve years since several coke oven owners in the North of England put down special coke screening and breaking plant to supply properly graded coke for the domestic market, and expended considerable effort to cultivate the trade. They developed a load in which many of the local gas undertakings took little interest.

We have to face up to the likely influx of oven coke in the domestic market. It is a wide enough field, and there is plenty of room for coke provided the field is properly cultivated, and sales are planned on a sound economic basis. Cut-throat competition between gas coke and oven coke can only spell disaster, but with full co-operation between the two great carbonizing industries there can be no need for pessimism. But full co-operation there must be—and the sooner the better. This, in fact, was the major theme of Lord Ridley's Address, and it is a point which we have been at pains to stress time and time again in these columns. After all, there is co-operation between the two industries in the sales of, and research into, benzole. The same can be said of the co-operative policy in regard to tar and pitch and sulphate of ammonia. On the subject of coke the two industries, it is true, associate on the research side, but in the important field of coke sales there has been practically no co-operation—in many places none at all. It is all very remarkable, and the problem assumes added proportions as the sale of coke oven gas to gas undertakings increases.

It may be said that, as the gas undertakings which buy coke oven gas cease to that extent to manufacture gas, and therefore do not make coke, the effect on the domestic coke market is negligible. Closer examination will show, however, that this is not the case. The amount of gas put into the holder per unit of coke placed on the market varies greatly between coke oven and gas-works practice. The situation was neatly expounded by Lord Ridley, who spoke with authority on the matter. A gas-works may make 15,000 cu.ft. of coal gas for every 9 cwt. of coke put on the market. A coke oven works using coke oven gas for heating the ovens only puts the same amount of surplus gas into the holder for 28 cwt. of coke put on the market. The coke oven has to dispose of three times as much coke as the gas-works per unit of gas available for sale—*i.e.*, when the coke oven is specially making gas to deliver to the gas-works. If, as is usually the case, the gas-works is making water gas as well as coal gas, either by steaming or in separate plant, the comparison becomes still further pronounced, and it is possible for the coke made for sale at the coke ovens to be over four times as much as that made at the gas-works. Bearing in mind these considerations, any coke oven owner who contemplates making a gas contract should, if building a new plant, provide for heating the ovens with producer gas as an alternative to coke oven gas. Should there be a surplus of coke at any time, it can be used to make producer gas for heating the ovens and thus reduce the proportion of coke made, in terms of gas sold.

Clean Coal

We say that the domestic coke market can be and must be developed co-operatively. For this development we need not only price regulation on the lines adopted with such signal success by the London and Counties Coke Association, but the marketing of a uniform and better product, closely graded, to satisfy a more discriminating public. The question of ash and moisture content does demand greater attention. From time to time we hear of the desirability of putting into operation coke cleaning plant. This does not appeal to us as a solution. The cleaning process should start at the source—with the raw coal, which is much easier to handle than is coke. There should be greater insistence on cleaned coal. We are not concerned here with what process is employed, but Lord Ridley in his Address gave one instance where the contractors guarantee to reduce the ash content of the coal to within 0·1% of its inherent ash. An all-round figure of 6d. per ton was given as the cost of cleaning the coal. But think of the advantages to the carbonizing industries of dealing with coal containing practically no extraneous ash. Think of the savings which would accrue in transport, in handling, in increased throughput of carbonizing plant, and of what a step forward it would represent in the marketing of coke for domestic purposes.

There is one other point in Lord Ridley's Address to which we would call particular attention, and that was concerned with refractory materials, upon which the construction, life, and efficiency of a carbonizing unit so largely depend. The Institution of Gas Engineers has, of course, always taken a keen interest in the development of refractories. It was among the first to initiate research and give active support to the British Refractories Research Association. The Gas Industry—indeed, the carbonizing industry generally—has reaped the benefit of the Association's work in an improved standard of product. Retort settings of all types give ever-increasing life as the result of research. But, as Lord Ridley emphasized, one of the chief troubles of the maker of refractories is the ever-increasing number, size, and complexity of the shapes used in the construction of modern carbonizing units. One silica brickworks which produces a great proportion of these shapes has at present in stock over 1,800 steel moulds used in this work alone, and it is not unusual to have 100 of these in use in one day. At this works 14 sizes and about 50 different sections of horizontal segmental silica retort are made. Many of these vary only by ¼ in. in size or in the radius of certain corners, but each requires a different set of moulds entailing extra cost. This is a typical example of the state of affairs which results from lack of co-operation. These moulds could, without great difficulty, be reduced to quite a small number of sizes and types with essential characteristics, and the Gas Industry would benefit in reduced cost, quicker delivery, and speedier repairs.

Attractive Tariffs

In the Paper to which we have referred Mr. Gill expressed the opinion which we have long held, that all gas undertakings should have a tariff system calculated to fulfil all the requirements of domestic, commercial, and industrial consumers. Without suitable tariffs we cannot clinch business which definitely awaits us. Without attractive tariffs the electrical industry would not have made the headway it has made. "Theoretically," said Mr. Gill, "the two-part tariff should always result in an initial reduction in revenue and often a substantial reduction. . . . However, experience seems to show that the feared revenue losses from the introduction of this system are not realized in practice. . . . Experience shows that quite a section of consumers who used little gas when they were charged a flat rate become good consumers when they join the two-part tariff system." We realize that the best time to institute attractive forms of charge—either two-part or some other method—is when prices are falling. At present prices generally are on the up-grade. Even so, we think that gas undertakings cannot afford to delay the introduction of promotional tariffs alternative to the flat rate. The increase in the use of gas for industrial purposes dates from the time when preferential tariffs were introduced for such purposes. Similarly, a greater development of gas for domestic purposes would follow the introduction of new tariffs.

One has only to consider the potentialities of the continuous heating load. Gas for continuous heating at a price wholly competitive with raw coal should alter the outlook of the Industry. The flat rate will not get this load, but it can be gained by attractive—and economically sound—tariffs. The Newcastle Undertaking provides a good example of what can be accomplished by gas in the continuous heating field. The average consumption per ordinary consumer in the Company's area is 130 therms per annum. The average consumption of the consumers who have all gas heating is 650 therms a year. This all gas heating is competitive in price with raw coal, which in the district is obtainable at about 34s. per ton delivered. These figures show the high potentialities of the domestic consumer when attractive tariffs for gas are in force.

We have, however, discussed the tariff question with too many individual gas managers to wish to be entirely dogmatic, realizing as we do the special problems which are inherent in certain cases. At the same time we were surprised to find anybody still so anti-tariff as was Mr. J. Kennington in his recent Eastern Counties Presidential Address when he said: "I have yet to be convinced that there is any virtue or sound business in selling gas at half the recognized price, *plus* a service charge. I have the feeling that very often such schemes are subsidized by the ordinary or domestic user, who in my opinion is the mainstay of our consumption." We look at the matter in a different light. To our mind, the burden of the Gas Industry is the domestic consumer who entails much capital expenditure to afford him a supply of gas and then uses very little of it—insufficient, in fact, to cover overheads. He is the one who is subsidized by the good consumer. It can be shown—indeed, it has been demonstrated—that the Gas Industry can, on an economically sound basis, offer consumers gas at a price for continuous heating competitive with raw coal. It is in this enormous field that the future of the Industry lies. It should be borne in mind that at present gas meets only 18% of the domestic requirements of useful heat—raw coal, 52%.

Appliance Prices

During the last few months much discussion has centred on the terms on which various gas undertakings offer appliances to their consumers. The question is one of importance, and views on it have been ventilated freely in our columns. As we have said before, we discover neither rhyme nor reason for the extraordinary divergence of policy on what could be and should be a simple matter. The whims of individual undertakings are being allowed to confuse and irritate alike manufacturer and consumer and impose an unnecessary handicap on the gas salesman. When the topic is up for

discussion arguments are advanced in an attempt to justify this wide divergence of policy. A great deal is said about local conditions, maintenance costs, and competition. Not one of these arguments has convinced us that more uniform pricing is impossible—or even difficult—of attainment. All that is needed is less whim, more co-operation. To make confusion worse confounded, individual undertakings insist on minor modifications of appliances to meet "local conditions" while in the same breath demanding cheaper appliances. If it were not of importance, this lack of agreed policy would be amusing. It is, however, of very great importance. It bewilders the consumer; it does more harm to gas sales than is generally imagined.

Interesting figures were recently put forward by Mr. W. N. Denman, Distribution Superintendent of the King's Lynn Gas Company, showing in telling fashion the extent of the disparity which exists in appliance prices offered to consumers by various gas undertakings. For one well-known cooker, for example, the consumer in one town has to pay £4 13s. 6d. more than in another. Why? The discrepancy in the terms offered for a certain multipoint water heater—again of well-known make—is even more astonishing. Mr. Denman set out the charges made for this particular appliance by 22 gas undertakings. The difference between the maximum fixed price and the minimum fixed price was £12 10s. Is this to be explained away by the incidence of "local conditions"?

We fail to see why gas undertakings should go out for large profits on the sale of appliances, which are merely a means to an end—the sale of gas. We do not suggest that any appliance should be put out at a loss. The result would be only to burden the price of gas. On the other hand, we find no merit in the policy adopted by some undertakings of overloading the cost prices of appliances with charges for fixing, maintenance, interest, and a "handsome" profit. As Mr. George Dixon pointed out in his Paper at the B.I.F. Conference, there are undertakings which "overload" to such an extent as to remove an appliance from the field or class for which it was rightly intended.

It will be agreed that one of the essentials of salesmanship is to gain the confidence of the consumer. The inconsistency in selling prices prevailing to-day makes this difficult of achievement. Given more uniform prices a big obstacle would be removed and the salesman's task would be simplified. People are mobile these days. This must be taken into account. Take the case of a consumer who has purchased an appliance from her local gas undertaking—it may be a cooker or a water heater. She is satisfied with its performance and delighted with its appearance, and she thinks her money well spent. She has become gas-minded. A short time afterwards she passes the showrooms of a gas undertaking in another locality and finds displayed in the window precisely the same appliance—but with this difference, that the price charged for it, fixing complete, is far and away below what she herself has paid. Her confidence in her local gas undertaking and in the Gas Industry as a whole is not increased. Again, consider a satisfied consumer who moves from one district to another only to find that his gas appliances will cost him far more than what he previously paid. Can he be blamed if his thoughts turn to electricity?

It becomes of more and more importance that the great variation in policy and prices between adjacent undertakings should be eliminated. It is in the best interests of the Industry to ensure that the terms offered to gas consumers in contiguous areas should be as nearly as possible the same. For which reason we were glad to call attention in these columns a week or two ago to the progress which has been made by the South Eastern Gas Corporation towards the standardization of appliance prices. All undertakings in the western group adjoining the Gas Light and Coke Company are now selling appliances at the same price as that Company. It is a move which should be followed, even though it may mean re-adjustment and temporary inconvenience. This is no time for the parochial outlook, the individual whim.

Institution Transactions

We congratulate The Institution of Gas Engineers on publishing prior to this week's General Meeting the Volume of the Transactions for 1937-38. The Transactions have thus been brought completely up to date—a task which we know has been no light one. The present Volume, No. 87, while it cannot lay claim to be the "biggest yet," runs to 1,290 pages. As usual, it is excellently produced and carefully and fully indexed.

Forthcoming Engagements

June.

10.—Manchester and District Juniors.—Visit to Chester.
12.—L.C.C.A.—Technical Committee, 2.30 p.m.
13.—Federation of Gas Employers.—Central Committee, Gas Industry House, 12 noon.
13.—N.G.C.—Central Executive Board, 2.30 p.m.
14.—Coke Salesmen's Circle.—Visit to Works and Laboratories of Eagle Range and Grate Company, Ltd., Aston, Birmingham.
15.—B.G.F.—Joint Exhibition Committee, Gas Industry House, 2.30 p.m.
16.—National Joint Industrial Council for the Gas Industry.—Annual General Meeting, Gas Industry House, 11.30 a.m.
17.—Western Juniors.—Summer Meeting at Bournemouth.
21.—I.G.E.—Domestic Heating Committee, 2.30 p.m.
22.—S.B.G.I.—Council Meeting, 11.15 a.m.
23.—North of England G.M.A. (Auxiliary Section).—Half-Yearly Meeting at Newcastle-upon-Tyne and Chairman's Address by Mr. G. J. Duncan.
23.—Southern Association (Eastern District).—County Meeting at Southall.
23.—Southern Association (Western District).—Commercial Meeting, Rougemont Hotel, Exeter, 2.15 p.m.
23.—Waverley Association.—Annual Meeting at Edinburgh.
24.—London and Southern Juniors.—Summer Visit to Windsor.

"Gas Journal" Directory

In order that readers may be able to keep the particulars contained in the "Journal" Directory up to date, we summarize in the following list various changes which have occurred during the past month:

Page 16. CHELTENHAM. A. L. Morris appointed G.M.; A. G. Holtam, Dist.M.; and L. R. Cowley, W.M.
„ 16. CHESTERFIELD. C. H. Davies appointed E. & M., vice H. Davies (who is to retire in October).
Page 18. COCKERMOUTH. J. S. McLaren appointed E., M., & S., vice A. F. Young.
„ 22. DOWLAIS. I. F. Grix, resigned.
„ 42. LUDLOW. C. B. Felton appointed E., M., & S.
„ 44. MANSFIELD. F. C. Sylvester appointed E. & M.
„ 46. MELTON MOWBRAY. J. H. Canning, jnr., appointed E. & M.
„ 50. NEWPORT (Mon.). R. S. Snelling appointed G.M. & S.; and J. F. Rust, E., vice J. H. Canning, retired.
„ 50. NEWTON-IN-MAKERFIELD. F. C. Sylvester, E. & M., resigned.
„ 60. ST. AUSTELL. I. F. Grix, appointed S.-Acct.
„ 74. WATFORD. E. T. Warren appointed S.; T. C. Battersby, G.M. & C.E., vice G. Wilks, deceased.
„ 74. WELSHPOOL. J. H. Canning, jnr., transferred to Melton Mowbray.
„ 82. BLAIRGOWRIE. J. S. Edney appointed E., vice A. Stewart, retired.
„ 90. LANGHOLM. J. S. McLaren, E. & M., resigned.
„ 92. PAISLEY. S. Smith apointed E. & M., vice A. S. Nisbet, retired.
„ 96. COLERAINE. F. G. M'Elwee, E. & M., deceased.

Personal

Sir BASIL MCFARLAND, Bart., who was elected Mayor of Londonderry last week, is a Director of the Londonderry Gas Company. He succeeded his father, the first Baronet, on the Board. He is only 41 and is the youngest Mayor the ancient city has ever had.

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A century-old family connexion with the Alliance and Dublin Consumers' Gas Company has been broken by the resignation of Mr. HENRY F. COTTON, Distribution Engineer. Mr. Cotton was made a Freeman of the City at the age of 21 and is the son and grandson of a Freeman. His father, the late Thomas J. Cotton, was for many years associated with the Company. His uncle, the late Alderman William Cotton, became associated with the Gas Industry in Dublin a century ago and was responsible for the amalgamation of the two rival companies, founding the present Alliance and Dublin Consumers' Company. Mr. Henry Cotton received his early training for the Industry in the Liverpool United Gas Light Company, later joining the staff of that Company. In 1909 he was appointed by the Dublin Corporation Superintendent of Public Lighting, City Gas Analyst, and Board of Trade Inspector of Meters. Six years later he was appointed by the Dublin Gas Company to take complete charge of the sale and distribution of gas in Dublin. Because of his expert technical knowledge and experience he has since played a prominent part in the attainment of the remarkable and continued progress of the Company.

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Mr. JAMES S. MCLAREN, who has been Engineer and Manager of the Langholm Gas and Electric Supply Company for some years, has been appointed Engineer, Manager, and Secretary of the Cockermouth U.D.C. Gas Department.

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The Directors of Gas Consolidation, Ltd., have appointed Mr. J. H. CANNING, Jnr., who for the past four years has been Manager of the Welshpool Gas Company, to be Engineer and Manager of the Melton Mowbray Gas Light and Coke Company.

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Captain C. B. FELTON, who for a number of years was Manager of the Crindau Works of the Newport (Mon.) Gas Company, has been appointed by the Directors of the Severn Valley Gas Corporation, Ltd., to the position of Engineer, Manager, and Secretary of the Ludlow Union Gas Company.

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Mr. F. C. SYLVESTER, Gas and Water Engineer and Manager to the Newton-le-Willows U.D.C., has been appointed to a similar position with the Borough of Mansfield. Mr. Sylvester was trained at West Bromwich under Mr. W. H. Johns (now of Swansea) and he later became Assistant Engineer and Manager to the late Mr. Fred Lee at Hinckley, being appointed to his present position in 1931.

On the day of Mr. Sylvester's appointment to Mansfield, Mr. WILLIAM WEDGWOOD, Assistant to Mr. Sylvester at Newton-le-Willows, was appointed to the position of Assistant Engineer and Manager to the Jersey Gas Light Company, Ltd. Mr. Wedgwood served his Articles with the Borough Gas Engineer of the Workington Corporation Gas Department, Mr. Hedley Hoy; he was appointed Technical Assistant to the Gas Engineer at Shipley, being appointed to his present position in 1930.

Obituary

HORACE M. THORNTON, J.P.

"Institution week" had a shadow cast over it by the news of the death on Saturday, June 3, following upon only a few hours' illness, of Mr. Horace Moore Thornton, J.P., M.Inst.M.E., M.Inst.C.E., M.Inst.Gas E., whose long and active association with the cooker and fire business entitle him to be included among the pioneers in an essential branch of the Gas Industry. This remark must not, however, by any means be taken as indicating that his work was confined to that particular section of consuming appliances, for he took a wide and ever-increasing interest in the industrial uses of gas, where, also, his early work may be regarded as having been of a pioneering character. Just over a quarter-of-a-century ago, at the second annual conference of the British Commercial Gas Association, he discussed in a Paper the development of the use of gas for industrial purposes. He then expressed his firm belief in the rich rewards that would be obtained by undertakings giving special attention to this subject; and subsequent events have overwhelmingly demonstrated the soundness of his judgment. Concluding words of that Paper revealed his attitude towards his work, and the spirit in which his friends will always remember him: "We know we are working not merely for private gain, but for public service." It may be mentioned here that his labours in furthering the use of gas for industrial purposes were acknowledged by the Royal Society of Arts by the award of a silver medal for a Paper on this subject in the year 1915.

Among his many activities, a foremost place was held by the Society of British Gas Industries, and it was in the year 1916-17 that he occupied the position of Chairman of the Council—at a time when our Empire was engaged in a life-and-death struggle, and the whole outlook was obscured by the threat of the unknown; yet there was nothing unbalanced or exaggerated about the address delivered by him on that occasion—which, indeed, was typical of the man. A quiet, even retiring disposition, in fact, marked his work on all occasions, though his labours were none the less wholehearted and effective on this account. Reflections upon chats from time to time enjoyed with Mr. Thornton on social occasions connected with the Industry, inevitably recall memories of Mr. E. W. T. Richmond, that stalwart of days long gone, whose lamentable death as the result of a bicycle accident will be remembered still by older readers of the "JOURNAL."

Mr. Thornton, who died at his home at Purley, at the age of 67, was a Managing Director of Radiation Ltd., Chairman and a Managing Director of Richmond's Gas Stove Company, Ltd., George Glover & Company, Ltd., Clark's Stove Company, Ltd., and George Newton, Ltd.

He joined the Richmond Company in 1893, at the invitation of the late Mr. E. W. T. Richmond, and represented the Company in the North of England. He was instrumental, with Mr. Richmond, in building up the Company from very small beginnings. In 1897 the Company opened works at Stratford, London, E., and Mr. Thornton was appointed Manager, with control also of the sales of the southern half of the country. In 1903, on the death of Mr. Richmond, he was appointed Managing Director.

In October, 1904, the Stratford works were closed. The whole of the manufacturing was then centralized at Warrington, and Mr. Thornton moved to the London Offices and Showrooms of the Company, in Queen Victoria Street. In 1923 he became Chairman of the Richmond Company and its subsidiaries. On the formation of Radiation, Ltd., he was appointed a Managing-Director.

Mr. Thornton was associated with the late Mr. Charles Clare in the formation of the Society of British Gas Industries, and was successively its Hon. Treasurer and Hon. Secretary, and Chairman of Section VI. He was also a strong supporter of the British Commercial Gas Association at its inception, and served on the Executive Committee for many years.

Among his other activities, he was a member of the Council of the British Gas Federation, Central Gas Advisory Board, Gas Industry Committee of the British Standards Institution, Advisory Committee on Research of The Institution of Gas Engineers, and the Joint Advisory Committee of the National Gas Council.

Mr. Thornton took a prominent part in municipal affairs, and in 1912 was appointed a Justice of the Peace for the County of Essex.

The sympathy of his many friends in the Industry will be extended to Mrs. Thornton, his two daughters, and his son, Mr. Maurice H. Thornton, who is a Director and General Manager of Richmond's Gas Stove Company, Ltd.

Memorial Service.

A memorial service to Mr. Thornton was held at Purley Congregational Church on June 6, and about two hundred were present, including the whole of the Board of Radiation, Ltd., and Associated Companies. The President of The Institution of Gas Engineers was represented by Sir Frederick J. West, Vice-President.

The Society of British Gas Industries was represented by Mr. C. G. Langford, Vice-Chairman, Dr. E. W. Smith, Hon. Secretary (who was also representing The Institution of Gas Engineers), and Mr. M. W. Burt, Manager. Mr. Evan Rees was present, also representing Mr. C. M. Croft, Chief Engineer and General Manager, Wandsworth and District Gas Company. The British Commercial Gas Association were represented by Mr. W. D. Elson. Mr. Potter represented Messrs. R. & A. Main, Ltd.

News of the Week

New Offices for the Gas and Water Department are under consideration by the Widnes Gas Committee.

Eight Drivers of the Folkestone Gas and Coke Company received Safe Driving awards on June 1, the Mayor (Alderman Gurr) making the presentations.

A Bulk Gas Supply will be given by the Wellingborough Gas Light Company to the area now supplied by Gas-Works at Wollaston, which undertaking has now been absorbed by the Wellingborough Company. Wellingborough and Wollaston are now being linked up by 5,000 yd. of mains.

A Remarkably Fine Record is that of Mr. John West, Edinburgh, who has just retired after 52 years' service with Messrs. Alder & Mackay, Ltd. Mr. West has seen the firm develop from a small concern to one of the largest gas meter companies with branches all over Britain and the Colonies.

At a New Holiday Camp, capable of accommodating 500 guests, now being erected at Westward Ho!, gas will be exclusively used for cooking, water heating, and space heating. Mr. W. H. Bennett, Chairman, announced this fine achievement at the recent annual meeting of the shareholders of the Bideford Gas and Coke Company.

An Increase in gas charges of 0·2d. per therm (1d. per 1,000 cu.ft.) is announced by the Newcastle-upon-Tyne and Gateshead Gas Company. It is stated by the Company that the Directors regret the increase, which is necessary owing to the large increase in the cost of coal, which also affected the price of their coke oven gas supplies.

The Possibility of a Bulk Supply from Ramsgate to Sandwich was considered at a meeting of the Ramsgate Town Council on June 1, when it was resolved that, if Sandwich wished to discuss the question, the Chairman and Vice-Chairman of the Gas and Water Committee, with the Engineer, should be authorized to deal with the matter.

The Public Lighting Contract in Leighton Buzzard has been renewed for a period of ten years from July 1 with the Leighton Buzzard Gas Company. Group "A" lighting is to be installed in the main streets and group "B" in the secondary and by-roads. The Gas Company's tender was accepted in competition with the Luton Corporation Electricity Department and a local firm of electrical engineers.

At the Lichfield Bower Festival, one of the most popular Whitsuntide attractions in the West Midlands, a tableau was entered by the Lichfield Gas Company, who were awarded first prize in the tradesmen's class. The entry featured many of the appliances chosen by the War Department for the new Whittington Barracks, the first two blocks of which have been equipped. In a year's time the work should be completed.

Among New Companies registered recently in Scotland under the Companies Act is the Auchtermuchty Gas Company, Ltd., Burnside, Auchtermuchty, having a capital of £3,000 in £1 shares. The object of this private company to carry on in the Burgh and parish of Auchtermuchty and elsewhere in Fife the business of a gas company and to acquire and take over the whole gas-works, properties &c., of the Auchtermuchty Gas Light Company and its whole liabilities.

Tenders for a Carburetted Water Gas Plant were considered by the Plymouth Corporation Gas Committee at a meeting on June 1, when it was decided to make application for sanction to borrow £21,000 for the plant, including the cost of the foundations. The revenue accounts for the year ended March 31 were presented, and these showed a net surplus of £1,598, which, after payment of certain private street works, it was resolved to add to the reserve fund.

Arrangements for the Sixth Annual Conference of the Institute of Vitreous Enamellers, which is to be held at the Grand Hotel, Birmingham, on Sept. 22, 23, and 24 next, are now being made by the Conference Committee. The following provisional programme is tentatively arranged: Friday, Sept. 22.—Works visit to various enamelling plants in midland area; Annual General Meeting and Annual Banquet. Saturday, Sept. 23.—Technical Papers; Theatre Party; and Supper. Sunday, Sept. 24.—Works visit in midlands district.

As from Oct. 1 the Harrogate Gas Company intend to supply gas of a calorific value of 500 B.Th.U. gross per cu.ft. in substitution for the quality of 460 B.Th.U. as now being supplied.

For Approval by Resolution a draft of the Special Order, for which the Glastonbury and District Gas Company, Ltd., are applying to the Board of Trade under the Gas Undertakings Acts, 1929 to 1934, has been laid before both Houses of Parliament. The Company seek powers *inter alia* to acquire the Gas Undertakings of the Glastonbury Corporation. Another Special Order submitted to both Houses of Parliament for approval by resolution is that of the Sutton-in-Ashfield U.D.C. Gas Department, which seeks, *inter alia*, to extend the limits of gas supply.

Through the Enterprise of the Dumfries Corporation Gas Department, an exhibition of modern gas appliances, in conjunction with which cookery and laundry demonstrations were given daily, was officially declared open on May 29 by Provost Lockerbie in the presence of a large gathering. Bailie A. Dobie presided, and others present included Mr. W. Gray, Convener of the Gas Committee: Dean Cruickshank; Mr. T. Bell; Mr. Johnstone, Engineer and Manager; and Mr. M'Ewan, of Messrs. R. & A. Main, Ltd. The exhibition continued until June 2. Messrs. R. & A. Main, Ltd., and Messrs. W. H. Dean & Son, Ltd., exhibited many models of their improved appliances. Mr. M'Ewan expressed thanks on behalf of the manufacturers for being allowed to display their goods in conjunction with the Department. Cookery demonstrations were given twice daily by Miss Olive Edwards, L.C.A., of Messrs. R. & A. Main, and daily laundry demonstrations were given by Messrs. Dean & Son.

The Importance to West of Scotland Industry of finding a market for coke oven gas was again emphasized by the Directors of the Glasgow Chamber of Commerce at their monthly meeting on May 29. A resolution was submitted from the Junior Chamber asking that consideration be given to the following extract from the Scottish Economic Committee publication, "Scotland's Economic Future": "The Economic Committee earnestly hopes that a market for the coke oven gas will be found at an early date." Sir Cecil M. Weir, the President, said it was a similar point of view to that expressed by the Directors on several occasions. He was glad to notice that Lord Provost Dollan (Glasgow), when speaking at a function at which the representatives of Messrs. William Dixon, Ltd., were being entertained, had expressed the hope, in reference to the recent development of the coke oven plant at a cost of £250,000, that an arrangement would be come to by which the by-product gas would be made available for the use of the community.

A Very Successful Series of cookery demonstrations given by the Knutsford Light and Water Company, in conjunction with General Gas Appliances, Ltd., concluded on May 19. The demonstrations were very ably carried out by Miss M. A. Feilden, M.C.A., U.F.C.A., using "Major" and "Ensign" cookers. A comprehensive display of "General" gas appliances was arranged in the hall and particular interest was shown in the new "Major" cooker, whose striking appearance and unique features quickly won general approval. The Whitchurch (Salop) Gas Company also held a highly successful series of cookery lectures from May 15 to 19 inclusive. Demonstrations were given by Mrs. Trainor, M.C.A., who used "Major" and "Ensign" cookers. It is pleasing to record the success of a cake-baking competition. There were two sections, four prizes being given in the adults section and three in the children's. Cookery books were given as consolation prizes. The demonstrations were well attended, and here, too, great interest was shown in a display of "General" cookers, Dean wash-boilers, and "Newlyn" water heaters.

Irish Association of Gas Managers

Annual Meeting

The Annual Meeting of the Irish Association of Gas Managers will be held in Dublin on July 25 and 26. Details of the arrangements for the proceedings are not yet available.

Wales & Monmouthshire Association of Gas Engineers and Managers

Results of Golf Competition

The half-yearly golf meeting of the Golf Association of the Wales and Monmouthshire Association of Gas Engineers and Managers was held on May 24, the day prior to the annual meeting, a report of which will be found in our issue of last week. Play for the Upjohn and Dean Cups was over the course of the Tredegar Park Golf Club, Newport, and took place in brilliant weather. The usual informal dinner of the Golf Association was held at the Westgate Hotel, Newport, the same evening, the chair being taken by the President, Mr. J. Herbert Canning, O.B.E., J.P., Director of the Newport (Mon.) Gas Company. The results of the day's play are as follows:

UPJOHN CUP.

R. R. Bird (Cardiff)	..	..	80 – 7 = 73
E. Hurst (Manchester)	..	..	89 – 15 = 74
F. Boardman (Cardiff)	..	..	88 – 13 = 75
C. R. Averill (London)	..	..	87 – 11 = 76

DEAN CUP (BOGEY SINGLES).

F. Boardman (Cardiff)	..	..	..	1 down
R. R. Bird (Cardiff)	..	..	..	3 down
W. A. R. Richardson (Cardiff)	..	..	..	5 down
F. Drake (Halifax)	..	..	..	5 down

Cookery Demonstrations at Shipley

Our photograph shows the presentation of prizes in the cake-baking competition held recently by the Shipley Gas Department during their cookery demonstrations. The demonstrations were held at the Picture House, Baildon, Miss G. Hiscox, M.C.A., of the Parkinson Stove Company, conducting the demonstrations, which were very well attended, and the results most gratifying. Mr. Horne (Sales Manager of the Shipley Gas Department) organized the demonstrations in collaboration with the Parkinson Stove Company. Special demonstrations were given for schoolchildren.

Radiation Hire-Purchase Ready Reckoner

A good reception is being accorded a ready reckoner for hire-purchase rates, which has recently been produced by Radiation Ltd. The publication is in very handy form, bound with stout green covers, and contains two tables. The first of these gives the hire-purchase price as a percentage over the basic price while the second gives quarterly payments to be made over one year to ten-year periods. In the first table the basic prices given range from 6d. up to £20 in fifty-five amounts, while the hire-purchase price percentages are given from 1 to 50 in twelve stages. The second table gives seventy-five different hire-purchase prices from 6d. to £30. This publication should prove to be of invaluable assistance to those responsible for appliance sales.

New Joint Hon. Secretary of N.G.C.

At the Annual General Meeting of the National Gas Council on May 9 Mr. W. W. Townsend, Managing Director and Engineer of the Colchester Gas Company, was elected Joint Hon. Secretary with Sir Francis Goodenough. Mr. Townsend has been a member of the Central Executive Board since its inception, and for many years Secretary of the Eastern District, of which, for the past two years, he has been Chairman. He is also a member of the Finance Committee.

W. W. TOWNSEND.

Mr. Townsend has served two periods as a member of the Council of The Institution of Gas Engineers, and has again been nominated by the Council this year to some up for re-election at the Meeting this week. He is Chairman of the Committee of the British Gas Federation which prepared the regulations governing the installation of gas pipes and gas appliances, issued by the Institution in August, 1937, and which is now preparing a similar specification with regard to water heaters. He has been a member of the Central Committee of the London and Counties Coke Association since its inception, and of the Executive Committee for several years. He is Chairman of the Coke Committee for the County of Essex.

Gas Publicity in the Channel Islands

This photograph was taken during a series of film shows and gas cookery demonstrations recently held at the Plaza Ballroom, Jersey, which attracted attendances totalling 2,119 people, and 251 competitors in a cake-baking competition. In addition to the cookery demonstrations, arranged by Fletcher Russell & Co., Ltd. (Radiation Ltd.), demonstrations of gas washing machines were given by W. H. Dean & Son, Ltd., and of water heating appliances by Ascot Gas Water Heaters, Ltd.

Board of Trade Enquiry in Glasgow

Waterless Gasholder Site Sought

The Board of Trade enquiry into the application by Glasgow Corporation for a Special Order under the Gas Undertakings Acts, 1920 to 1934, was held in Glasgow Burgh Court Hall on June 1 by Mr. R. L. Sich, Commissioner appointed by the Board.

The Special Order was to authorize the Corporation to purchase for the purposes of their gas undertaking 4·1 acres of ground in Helen Street. It was intimated by an agent that the Tarbreck Tenants' Association were raising objections to the Corporation's proposal to erect a waterless holder in Helen Street. The Association had met and had sent written notice of its objections. It had not, however, followed up the legal procedure necessary. There had been no time for him to prepare a case and unless the Board of Trade Commissioner was willing to grant an adjournment his only course would be to withdraw.

Mr. Sich intimated that he could not adjourn the enquiry and the agent thereupon withdrew.

For the Corporation, Mr. William Gordon, Deputy Town Clerk, said that the objectors might have thought that works were to be erected for the manufacture of gas. This was not so. They proposed only to erect a holder. The position was that objections could be lodged by the owners or occupiers of houses within 300 yd. of any place where gas was to be stored. The nearest house to the shell of the holder was 710 ft. away. A petition against the proposed erection had been sent in by local residents. Fully one-third of the signatures came from people who resided more than 300 yd. away.

Continuing, Mr. Gordon said that additional provision was necessary in Glasgow for gas storage in view of the increase in gas sales. The last addition to storage capacity had been made by the Department in 1901. Further storage accommodation was particularly necessary in the South-West area of the city, where some 28,000 new houses had been built since the war and where it was estimated that another 12,000 would be erected within the next ten years. There was also a large present and potential demand from the Hillington Industrial Estate. The whole of the district had been surveyed and the site chosen was the most suitable and perhaps the only one that was suitable.

Mr. Gordon pointed out that the decision to build in Helen Street had not been the result of hasty action by the Corporation, which had considered the matter for fully eighteen months.

Councillor Thomas Wilson, Convener of Glasgow Corporation Gas Committee, giving evidence, said the proposal had been discussed by his Committee at great length. The health of the community would not suffer if a holder were erected in the vicinity. At Tradeston and Dalmarnock they had houses much nearer the works than they would be in Helen Street, while the holders there were not of the waterless type.

Mr. J. W. McLusky, Gas Engineer and Manager, also gave evidence, and thereafter the Commissioner viewed the suggested site, his decision to be intimated later.

Cooks for the Army

The Bristol Gas Company are arranging lectures twice a week for the benefit of the newly formed Women's Auxiliary Territorial Service. Here we see Lady Apsley who was present at one of the demonstrations, where the women are being instructed in the preparation and cooking of suitable dishes for the army canteen.

Gas at Melbourne Exhibition

Radiation Display.

Throughout the entire duration of the 1939 Home and Building Exhibition at Melbourne, constant and lively interest was shown in the Radiation stand, for by means of continuous cooking demonstrations and broadcasting to the Exhibition visitors, Messrs. Coates and Co. Pty., Ltd., succeeded in attracting and keeping the attention of the public, more than 60,000 of whom visited the Exhibition.

The Lord Mayor opening the Radiation stand at the Melbourne Home and Building Exhibition. With him on the platform are (*left to right*), Mr. A. J. Crick, Miss Helen Sumpter, Mr. H T. Craig, and Miss Edna Stevens (Assistant Demonstrator).

A pleasing compliment was paid to the Gas Industry on the opening night, when the Lord Mayor of Melbourne officially opened the Radiation stand, and gave a start to the "New World" cooking demonstrations. After performing the official opening of the Exhibition from the main dais, the Lord Mayor, the Rt. Hon. Councillor A. W. Coles, accompanied by the Lady Mayoress, moved to the "New World" stand, and was welcomed by Mr. H. T. Craig, who then placed in the "New World" oven the dishes for the first complete dinner. The Lord Mayor then chained and padlocked the oven—a ceremony which never fails to impress audiences with the advantages of automatic cooking by gas—and at the invitation of Mr. A. J. Crick, who had been broadcasting the proceedings to the public, spoke a few words to the crowds who had gathered around the stand. This opening ceremony aroused tremendous interest, and crowds of people had returned to the stand long before the dinner was due to be taken out.

The Radiation stand, a portion of which is illustrated in the accompanying photograph, was designed to achieve a modern note, and indeed looked very attractive with its striking grey, scarlet and green, and blue colouring. The back portion was divided into two separate sections by a rounded partition, and each side served as a separate miniature showroom.

Heating and Ventilating Engineers

Summer Meeting

The summer meeting of the Institution of Heating and Ventilating Engineers will be held at Eastbourne on June 19, 20, and 21, under the Presidency of Mr. R. G. Crittall.

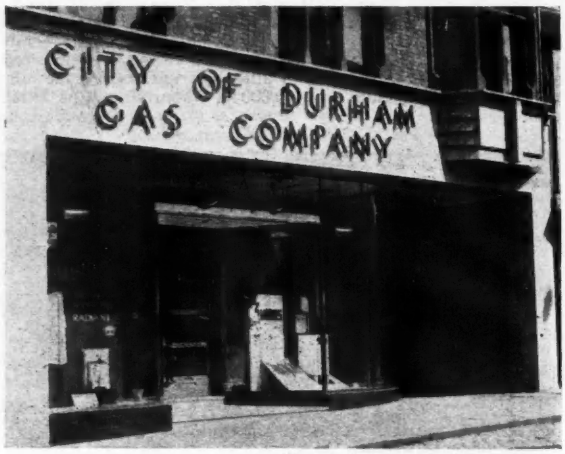
The Meeting opens on Monday, June 19, at 2.30 with a Council Meeting at the Grand Hotel, while in the evening there will be an informal gathering of members at 8 p.m.

On Tuesday, June 20, the members will be welcomed by His Worship, the Mayor of Eastbourne, Alderman A. E. Rush, J.P., at 10 a.m., after which, at a special meeting of members, Mr. A. F. Dufton, M.A., D.I.C., will read a Paper entitled "Heat Transmission Coefficients." A Banquet is to be held on the same evening at 7 p.m. The third day of the visit, June 21, will be occupied by a circular motor drive.

Sports events include a golf competition at 2 p.m. on Tuesday, June 20, while a tennis tournament and bowls competition are being held on the same afternoon.

New Gas Showrooms for Durham Consumers

In the presence of a large gathering the new showrooms of the City of Durham Gas Company were officially opened on May 23 by the Mayor of the City (Councillor W. F. Edge).



[Photos by Durham County Advertiser.

WITH its Gothic proportions and small windows the original building was unsuited to the purpose for which a showroom in the modern sense is essentially required, and the principal change in the outward appearance of the building is the complete remodelling of the lower portion of the street façade to provide a large window space, showing to advantage the full extent of the new showrooms which now occupy the whole of the ground floor of the building. The offices are on the first floor.

A window surround of Roman Travertine, standing on a black granite basis, has been applied to the lower portion of the frontage. The goods entrance doors have been set back from the frontage line, thus providing a good window space with adequate protection from the weather. Frames to the windows and the entrance door are in bronze with chromium-plated surrounds to glazed panels in the latter. The glazing of the entrance door, and the fanlight above, are decorated by sand-blasting process the design of the fanlight depicting Mr. Therm.

Internally, the showroom floor is covered with terazzo, ...le walls and ceiling are plastered and finished in paint of light tones. All the woodwork—counter, doors, staircase, and windows—is of oak, finished fairly light in colour. A barrier at the rear of the showroom is constructed of stainless steel. Permanent display fittings including gas fires, water heaters, with showcases for small appliances are incorporated in the general scheme, while in one window the provision of gas and water services in a compartment below the floor, will allow the installation of portable display units to be provided in the window itself.

On the first floor the existing front room has been divided to accommodate a large general office and a private office by means of an oak-glazed screen, designed to maintain the effect of the decorated plaster ceiling which extends over the two rooms.

The building is centrally heated by means of a gas-fired boiler in the basement serving a low-pressure hot water installation with "Rayrads" in the ceiling of the showroom and enclosed "Vectair" units elsewhere. A selected range of modern gas fires is permanently fixed in the showrooms and the rooms on the first floor. An interesting scheme of lighting is provided with special units over the entrance vestibule and in the windows.

THE OPENING CEREMONY.

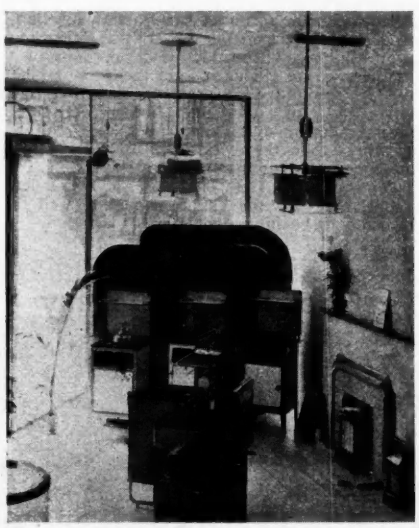
For the opening ceremony the Directors, staff, and guests assembled at the entrance of the showrooms, where Ald. T. W. Holiday (the Chairman of the Board) invited the Mayor to unlock the door. His Worship, who was accompanied by the Mayoress, was the recipient of a gold inscribed key, presented by Ald. F. W. Goodyear, on behalf of the contractors, as a memento of an interesting occasion. Ald. Goodyear said that the new showrooms and offices were a wonderful addition to the business premises of the city. The Mayoress was the recipient of a bouquet of carnations from Miss M. Britton, a member of the staff, and the Mayor having unlocked the door, the guests spent some time inspecting the spacious interior and the attractive display appliances.

An adjournment was made to the Dunelm Ballroom for tea. Ald. Holiday presided, and other Directors present were Ald. Goodyear, Sir Thomas Bradford, Mr. J. H. Armory, Coun. M. Fowler, and Mr. J. H. Harker. Among others present were Mr. G. W. Martin (Engineer and Manager of the Houghton-le-Spring and District Gas Company), Mr. F. Hornby (Engineer and Manager of the Annfield Plain Gas Company), Mr. A. G. I. Anderson (General Manager and Secretary of the Shotley Bridge and Consett District Gas Company), Mr. J. R. Cleator (Assistant Engineer and Manager of the South Bank and Normandy Gas Company), Mr. R. Carr (Secretary of the Bishop Auckland and District Gas Company), Mr. Alan S. Middleton (Secretary of the City of Durham Gas Company), and many others.

The CHAIRMAN, proposing a vote of thanks to the Mayor and Mayoress, said that the provision of the new premises afforded the Directors a considerable amount of satisfaction and fulfilled a personal ambition of long standing.

Sir THOMAS BRADFORD, seconding the vote of thanks, said they were grateful to the Mayor for associating himself with that day's proceedings. The Gas Company was one of the leading industries of the City, employing considerable local labour and buying large quantities of coal and other material locally, and that act of the leading citizen towards a leading Industry was greatly appreciated.

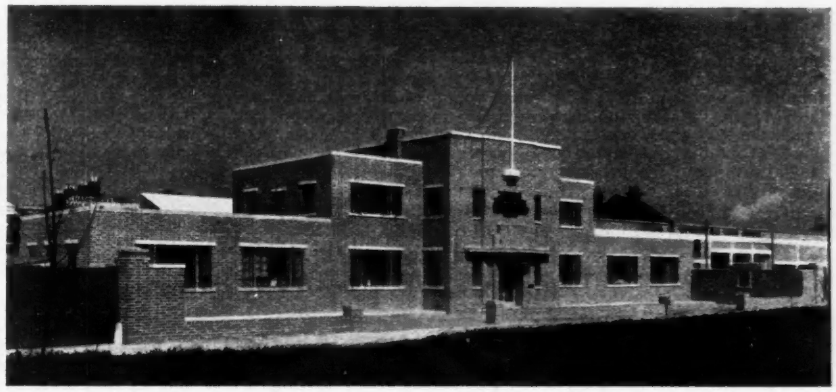
Replying, the MAYOR said they were indebted to the City of Durham Gas Company for the manner in which they had tried to give service. Just before he took office his predecessor, Coun. Bradley, opened a new gasholder. Whether that had speeded up the further example of enterprise they had seen to-day he did not know, but he felt that the people of Durham would agree that they were to-day getting a better supply of gas than hitherto. This had been brought about by the energies of the Directors. while in Mr. Middleton they had an ideal Secretary, a real go-ahead man. The Mayor went on to congratulate the Company on the excellent feeling existing between the management and the employees, and in conclusion he wished for the Company continued and increasing success, which they certainly deserved.



A Corner of the Interior.

The proceedings terminated with the presentation by Mr. D. McIntyre (one of the Architects) of a case of pipes to Ald. Holiday. Mr. McIntyre acknowledged the great assistance he had received from Ald. Holiday and Ald. Goodyear when dealing with difficult points such as were bound to arise on a job of complicated alterations; and from Mr. Middleton, Mr. E. H. Chapelow (Sales Manager), and Mr. R. W. Nicholls (Engineer and Manager).

ON Thursday last an enjoyable gathering marked the inauguration of the fine new works and offices at Wandsworth of Messrs. Thomas Potterton (Heating Engineers), Ltd.—a model of forethought and careful planning for the purpose in hand. Praise of the new premises was voiced by everyone who had the privilege of inspecting them.



Potterton's New Works Opened

AFTER a period of nearly ninety years Thomas Potterton (Heating Engineers), Ltd., have moved from Balham into new and splendidly equipped works at Wandsworth. Pioneering manufacturers of gas water heating units ranging from light domestic to heavy industrial, the firm have built up an enviable reputation throughout the heating profession, and more particularly, perhaps, throughout the Gas Industry. Their history is a story of British enterprise in the engineering field; and it is a story of continuous development in the best British tradition.

Gas-fired boilers were unknown when the first Potterton patents were taken out at the beginning of this century. There are now hundreds of thousands in use, fully automatic in operation, reducing labour and eliminating smoke. It is interesting to recall that the Smoke Abatement Society recognized the utility of this system as far back as the year 1908, when they presented Thomas Potterton with the first Bronze Medal in respect of a gas-fired boiler.

In 1928, a private limited Company was formed to consolidate the business, which under the guidance of Mr. A. B. Potterton and Mr. T. F. C. Potterton as Joint Managing Directors has grown completely beyond the capacity of the original premises, necessitating the erection of a modern factory with administrative buildings. The new factory is at Buckhold Road, Wandsworth, within the same Borough in which the business was founded.

The new buildings cover in all a site area of a little more than an acre, and an idea of their pleasing design can be gained from the photograph we reproduce. The Administrative block is well set back from the thoroughfare. It is well proportioned, unpretentious, and pleasing to the eye. It is partly two-storeyed and covered by asphalt flat roofs. A multi-coloured grey-red Dorking facing brick has been used most effectively, and the windows are horizontal barred steel casements with artificial stone lintels and sills.

The Entrance Hall.

The main entrance hall is octagonal in shape and provides useful recesses for the display of the firm's appliances. The whole of the joinery is in waxed natural oak. The offices for Executive and staff are in all respects well planned, the accommodation being ample and arranged in a most efficient manner.

Spacious drawing office, printing room, staff kitchenette, and ladies' rest room are on the upper floor, while also on the upper floor is a very attractive flat for the resident caretaker.

The single storey north-light production section is separated from the administrative block by two fire-resisting doors in addition to a steel shutter. It is a steel-framed construction, the external walls being formed with brick panels.

The layout comprises machine and assembly shops, spray shops, Works Managers' and Engineers' offices, large stores, and a canteen. The natural lighting is all that could be desired, and the same can be said of the artificial lighting, which is by gas. For the latter installation, Sugg's lamps are employed, and the installation was designed and carried out by the Wandsworth and District Gas Company. The whole of the building has been roofed with asbestos cement double sheeting with a view to reducing heat losses.

The factory buildings are heated by a coke-fired system, while separate gas-fired boilers are installed for domestic hot water supply and the warming of the administrative block as alternative to coke in the summer and when weather conditions render this alternative desirable; and these boilers serve also for demonstration purposes.

There is a large loading yard with petrol pump installation and ample garage accommodation for the firm's lorries and cars.

The new buildings were designed by and erected under the direction of Mr. T. W. Moore, F.F.A.S., of Messrs. Charles Saunders & Son, 40, Gloucester Road, S.W. 7, the contractors being Messrs. W. H. Willson & Co. (Builders), Ltd., Bromley, Kent.

This progressive firm are, in their new home at Wandsworth, admirably equipped to render still greater service to the Gas Industry and the heating industry generally.

A Welcome to the New Home.

A cordial welcome to the guests was extended by Mr. T. F. C. POTTERTON, who recalled the early days when the gas boiler was in the development stage. From a modest beginning—and thanks largely to the sales enterprise of the supply side of the Gas Industry—the business had grown to its present large proportions. Actually, the first request for a gas boiler came from a girls' public school, the requirement being for heating water for the science laboratory, and the appliance installed was the original patent of the "Victor" boiler. Mr. Potterton also referred to the early installation, in 1908, of a battery of 8 "Victor" boilers at Sandow's Curative Institute—a serive which proved so popular that three years later the installation was extended to 24 boilers. After the War, he continued, the activities of the Gas Industry—and he paid tribute to the help afforded by technicians in the Industry—resulted in a demand which led the firm to put on the market gas boiler units of far greater capacity than the early ones which had a rating of 30,000 B.Th.U. per hour. Those present would be able to inspect in the works boilers under construction having a capacity as high as 1,250,000 B.Th.U.—and no doubt the future would see still greater increases. At the same time, he would like to lay stress on the fact that the small unit market, the domestic heating field, was by no means being neglected by the firm. Concluding, Mr. Potterton expressed his regret that, owing to indisposition, Mr. Frank H. Jones, Chairman of the Wandsworth and District Gas Company, was unable to be present to say a few words at the opening ceremony. In the circumstances, Mr. C. M. Croft had kindly consented to take his place.

Mr. C. M. CROFT, Chief Engineer and General Manager of the Wandsworth Company, said how greatly Mr. Jones, who sent his best wishes for the success of the firm of Potterton, regretted his inability to be present. The firm, remarked Mr. Croft, had been founded

90 years ago, and the business was based on sound practical knowledge and wise and wide vision. The building which they were able to inspect that day was the outcome of continuous service to the community—an unbroken continuity of service by the same family. He was sure that all present would, with him, congratulate Messrs. Potterton on their fine new factory and offices, in which the staff and workmen could carry on their tasks under the most favourable and happy conditions. Service, said Mr. Croft, had always been the firm's motto, and their products were the best of their kind.

Mr. W. J. SANDEMAN, General Manager of the Croydon Gas Company, joined in congratulating Messrs. Potterton on their new premises. The firm, he said, had been a great help to the Gas Industry and their success was well deserved.

Acknowledgment of the excellent work of the Architect, Mr. Moore, was voiced by Mr. A. B. POTTERTON; and Mr. T. G. BROOKS and Mr. FRED BROOKS spoke of their long association with the firm—an association which throughout the years had been none other than happy.

It was intimated that members of the Institution visiting London for the General Meeting this week are assured of a warm welcome should they wish to inspect the new works.

GRIMSBY'S WELCOME TO

The Eastern Counties Association

Grimsby, the Undertaking of the President, was the venue on May 25 of the Ninety-Seventh Half-Yearly Meeting of the Eastern Counties Gas Engineers' and Managers' Association.

It may well be that the great British railway system does not include the "run" from the South to the important fishing port of Grimsby among what it claims as its "star turns," but the unstinted hospitality of the citizens and the unsurpassable charm, particularly at this season of the year, of the surrounding countryside, immediately make one feel that even the longest journey by the most leisurely train would be well worth while.

During the meeting of the Association twelve months ago, Col. J. Kennington (this year's President), proposing a toast, said that a good company deserved a good engineer and manager. He was at that time, of course, referring to an undertaking other than his own, but when his fellow members came to Grimsby for their meeting they soon realized that the Great Grimsby Gas Company was a very good one, with just the sort of engineer and manager that it deserved. The inspection of the gas-works, which constituted the first item on the programme of a very busy day, at once convinced the members that all is well with the Undertaking, and this conviction was strengthened with the delivery at the business meeting later on of the Presidential Address [see last week's "JOURNAL"], wherein was described the gradual transformation of the carbonizing system from all-horizontal to all-vertical retorts.

Biscuit-Baking By Gas.

The concluding portion of the Address described the extensive gas-fired installation at the modern biscuit factory of Watmough and Son, Ltd., at Great Coates, and a visit to this factory constituted one of the features of a memorable "outing" on the day following the meeting. On arrival at the factory, the visitors were received by Mr. E. Kirman, the Managing Director, and thereafter had the whole process of biscuit making shown and described to them by him and members of the staff. They saw biscuits being turned out by hundreds of employees at the rate of hundreds of tons a week, by the aid of gas supplied through a steel main at high pressure by the Grimsby Gas Company. The quantity of gas used is reliably recorded by "B.M." meters, situated with the governors in a building apart from the bakery. There are seven ovens, by Baker, Perkins, Ltd., Peterborough, which, with their complementary mixing machines, &c., are fixed in parallel lines along the length of the factory. In fact, the different ingredients do not deviate from the straight line until the finished product is wrapped and packed in cartons ready for despatch. The oven burner equipment was supplied and installed by the Keith-Blackman Company.

The inspection of the factory completed, the drive by motor-coach was resumed, the route taken being through Brocklesby Park to Riby, the home of the President. Here luncheon was served in a marquee erected in the delightful grounds of the old house—a house which, it was understood, was built some few years before the French Revolution. Only sunshine upon the beautiful scenery was needed to make the day an unforgettably happy one for everybody—and this the party enjoyed in full measure. Before rising from the luncheon tables, keen appreciation was expressed of the kindness of Colonel and Mrs. Kennington, which had made this great pleasure possible. Being enthusiastically called upon, Mrs. Kennington said, in reply: "It has been a great joy to have you with us to-day, and I do hope you have all enjoyed your stay in Grimsby. I have always been tremendously proud of my husband, in his business life and in his military career. To give pleasure to others is typical of him."

A vote of thanks was also passed to Mr. Kirman and his staff for the interesting visit to the biscuit factory.

The drive was then resumed to Grimsby by way of Immingham Docks, and on arrival at the gas-works tea was served, after which the President took leave of his guests.

Association Business.

The business proceedings took place in the commodious works recreation room, under the chairmanship of Col. KENNINGTON, who expressed his satisfaction at the attendance, which numbered close upon 70. He announced that their late Hon. Secretary, Mr. W. C. Chapman, would undertake the secretarial duties of the day, in the absence of Mr. H. H. Redwood, who, he was sorry to say, had just suffered a heavy bereavement by the death of his father. On behalf of the members, a telegram had been sent to Mr. Redwood, expressing sympathy with his mother and himself in their great loss. A telegram had also been despatched to the Wales and Monmouthshire Association, who were meeting in Newport that day, sending greetings and wishes for a successful gathering.

They were, continued the President, fortunate in having with them that morning Mr. R. Robertson, of Bristol, President of The Institution of Gas Engineers, to whom they extended the warmest possible welcome. (Applause.) They were also privileged to have with them Mr. John Terrace, who, in addition to having had a long connexion with Grimsby, was Hon. Secretary to the Institution.

The minutes of the last meeting having been confirmed, the receipt was announced of a number of apologies for absence. It was stated that a message of greeting had been received from Mr. C. F. Broadhead, Engineer to the Metropolitan Gas Company of Melbourne, who sent best wishes to the President and Association, and also greetings to any to whom he might be known personally.

The Past-President's Medal was then handed to Mr. Chapman by the PRESIDENT, who remarked upon the excellent services that Mr. Chapman had rendered to the Association, as Hon. Secretary for some half-dozen years, and then as President, when, it would be remembered, he gave them all a wonderful time at Boston. Might he live long to enjoy the memories which this Medal would bring back to him. Mr. CHAPMAN, in acknowledgment, said he had spent a very happy year as President, and the Medal would always be a reminder of the pleasant times he had had among the members of this Association.

During the past twelve months death had taken its toll, and the members stood in silence as a mark of respect to the memories of Mr. W. H. Mainwaring, of Lincoln, who had been a member for about forty years—latterly an honorary member—and Hon. Secretary and Treasurer from 1922-28, and of Dr. J. G. Stewart, of Letchworth, who had been an associate member since 1928.

The following resignations had been accepted with regret. They were caused mainly by retirement, or through leaving

the Industry. Members: R. W. Broadhead, West Worthing; W. H. Ely, Woking; W. H. Price, Cromer; J. C. Wright, Romford. Associate member: E. J. Davison, London.

New Members.

On the proposition of Mr. J. E. YOUNG (Grantham), seconded by Mr. G. ROBINSON (Watford), the following additions were made to the Membership Roll of the Association:

Members.—Stephen Eric Balsom (Lowestoft); William B. de Quincey (Cromer); Wilfrid Haworth (East Dereham).

Associate Members.—Cyril Douglas Birks (London); Charles Frederick Robinson (Watford); R. J. Rogers (Birmingham).

Benevolent Funds.

In connexion with the Committee's Annual Report and Statement of Accounts, which were adopted on the motion of Mr. F. G. BROCKWAY (Cleethorpes), seconded by Mr. A. GREGORY (Harwich), some discussion took place with reference to the Association and Institution Benevolent Funds.

It was pointed out that from time to time sums had been transferred from the general funds of the Association to their own Benevolent Fund, which at December last amounted to £190 2s. 5d., and a suggestion that a sum be so transferred on the present occasion was agreed to, on the proposition of Mr. B. CLARKE (Stamford), seconded by Mr. J. H. RIOCH (Cambridge).

The Committee recommended that the sum of £10 10s. be devoted to the Institution Benevolent Fund. Mr. C. R. FOWLER (Leiston) moved, Mr. G. A. MALLETT (Ipswich) seconded, and it was agreed, that this should be done.

Mr. ROBERTSON said that, as Chairman for the time being of the Institution Benevolent Fund, he had been in close touch with the work, and had had opportunities of reviewing the many applications that from time to time came before the Committee. The cases were very deserving indeed, and the money subscribed was being used to excellent purpose in this way. The only difficulty had been the limited supply of money at the disposal of the Committee. Various ways and means had been suggested for bringing the need for further support to the notice of those members of the Industry who did not already subscribe individually. As a matter of fact, more than 40% of the members of the Institution did not subscribe, so that the Committee had a strong case to work upon. Local interest would be invaluable in securing greater support for the Fund. In order to augment the income, the Committee of Management were drawing attention to an arrangement which, with the co-operation of the Inland Revenue Authorities, would enable the Fund to benefit by the amount of income-tax on annual contributions; and he would recommend that members should seriously consider the signing of a deed of covenant, copies of which were available in the room, agreeing to subscribe for a period of years. This would benefit the Fund to the extent of something like 35% increase on subscriptions so made.

Mr. TERRACE said, as many of them knew full well, the Institution Benevolent Fund Committee had been trying hard for many years to get more people to subscribe. The distressing cases that came before them made greater support very necessary. One difficulty they found themselves up against was that when people joined the Institution they frequently started with small subscriptions, and then when later on they got into better positions, and could afford to contribute more, they forgot to increase their subscriptions. This was one of the points they had in mind in suggesting that the matter be taken in hand by district secretaries.

The PRESIDENT remarked that it was the duty of those who were in the enjoyment of good circumstances to hold out a helping hand to others less fortunately situated.

It was then delegated to each Section of the Association to appoint representatives to assist the Institution to secure additional support for their Benevolent Fund.

Education Scheme Report.

Mr. E. F. KEABLE (Gorleston), the Secretary to the Scheme, next presented the Eastern District Education Committee's Report for the past year.

This stated that once again arrangements had been made for examinations to be taken under The Institution of Gas Engineers through various centres. Gas-fitting classes had again been well attended at the centres selected. Of 85 students, 20 were taking the Final Grade, having pursued their studies over the full period of five years. The Committee once more recorded their appreciation of the work done by the tutors of the classes, and their indebtedness to the Board of Education for the Short Courses for Teachers, to the gas undertakings which made the training possible and gave encouragement by the offer of prizes, and to the Education Authorities in the cities and towns concerned for their continued and valued co-operation. Thanks were also due to the Engineers of Cambridge, Colchester, Ipswich, Norwich, Lincoln, and Great Yarmouth, for having furnished competent examiners for the Gas-Fitting Examinations. "It is hoped," added the Committee, "that all who have qualified by years of study and practice will be rewarded and encouraged by their undertakings when promotions are taking place."

The number of students taking the B.C.G.A. Domestic Gas Salesmen's Course Examination during the period under review was six—all Norwich students. The Committee added: "This number is disappointing, but it is pleasing to state that this is being remedied during the present year, as seventeen students already will be ready to take the examination by the end of this month. This valuable course has been brought up to date, and it is hoped that undertakings will do all in their power to urge their salesmen to take full advantage."

Mr. KEABLE remarked that this was the twelfth year he had presented the report—ever since the inception of the Committee. He knew of no work of the Institution that was done more thoroughly than the educational work. Every student had a fair deal. Mr. Robertson and Mr. Terrace had done much to earn the thanks of the Industry in this connexion.

Mr. TERRACE said that, at the request of the B.C.G.A., the Institution had been preparing a scheme for the education of salesmen which was something far different from the schemes already running, and would represent an attempt to bring about education for salesmen in the same way that the Institution had set out to do on the technical side. Considerable progress had been made, but it would not be possible to start courses this year. Everything would be in readiness, however, for next year. This should prove a very valuable addition to the successful work that had been done already under the Education Scheme of the Institution. He would like to take this opportunity of thanking Mr. Keable publicly for the very able and loyal service he had rendered to the Education Scheme. The Eastern Counties presented a difficult area, and they felt they ought to do all they possibly could to provide opportunities for examination, even if they could not provide them for education. Their President was teacher to a very successful gas-fitting class at Grimsby in the years before the Education Scheme of the Institution came along, and when Col. Kennington went off on war work he (Mr. Terrace) had to take on his classes. The Eastern Counties Association had always been well in front in this matter.

The PRESIDENT declared that they were still enthusiastic on this subject at Grimsby. A gas-fitter at Cleethorpes won the gold medal for all England, and he believed he was still on Mr. Brockway's staff.

The adoption of the report and a vote of appreciation to Mr. Keable were agreed to, on the motion of Mr. C. E. WRIGHT (Ipswich), seconded by Mr. E. HUTCHINSON (Worksop).

The Presidential Address.

Col. Kennington then delivered his Presidential Address, after which

Mr. J. H. RIOCH (Cambridge) proposed a hearty vote of thanks, remarking that they had listened to a very practical Address, and one from which they could all derive much useful information. The President had occupied the chair with dignity and with efficiency. What had struck him most was the fact that, in dealing with his many problems, the President had always been prepared to take the long view. This was particularly in evidence in connexion with his handling of his carbonizing problem. Events had shown his policy to have been fully justified. It was pleasing to

note that he laid so much stress upon the importance of social contact.

Mr. B. CLARKE (Stamford) seconded the vote, which was carried with acclamation, and briefly acknowledged by the PRESIDENT.

Autumn Meeting.

The PRESIDENT stated that at a meeting of the Committee on the previous evening a warm invitation had been received from Mr. Grimwood to hold the autumn meeting of the Association at Sudbury on or about Oct. 19, on which occasion it was hoped that they might be able to persuade one of their younger members to give them a Paper.

The invitation was cordially accepted, on the suggestion of the PRESIDENT, seconded by Mr. KEABLE.

GUESTS OF THE GAS COMPANY.

At the invitation of the Chairman and Directors of the Great Grimsby Gas Company, members and friends sat down to luncheon in the Royal Hotel—Mr. W. H. WINTRINGHAM, J.P., Chairman and Managing Director of the Company, presiding. The receipt was announced of a telegram to the Association from the President and Members of the Wales and Monmouthshire Association: "Thank you for your greetings and good wishes, which are most heartily reciprocated. Signed, Canning, President." After lunch, the Mayor (Alderman H. Weldrick, J.P.) extended an official welcome to the town to the members and guests.

Capable Administration.

The toast of "The Chairman and Directors of the Great Grimsby Gas Company" was submitted by Mr. F. H. ROBINSON (Bishop's Stortford), who pointed to the flourishing condition of the Undertaking. The consumption of gas per mile of main was above the average, the capital was low, and the price of gas was low. This all pointed to very capable administration. The problems in connexion with the work of gas undertakings in general were not sufficiently understood. The service given had been uniformly good, and the supply so never-failing that the public had become apt to take them too much for granted. The Grimsby Gas Company, however, in every way showed their appreciation of the efforts of their officers and employees.

In the course of his response, Mr. WINTRINGHAM emphasized the fact that the Gas Company was really part of the town of Grimsby, and it was greatly regretted by the Directors that they should have had slightly to increase the burden on the town. The price of coal had, however, forced their hand, so that they had been obliged to make a very small addition to the price of gas. "I want to say," he proceeded, "how blessed is a Chairman like myself, who has the loyal support of his colleagues on the Board, and the men and women he works with in the Company, and above all I want to express my thanks for the magnificent service I get from your President." (Applause.) For some reason, gas had been practically banished from the streets of the town. They had only seven lights now, and these had been relegated to a very undignified position. He would like to ask the Mayor whether the town could not dedicate one or two streets to the Gas Company for lighting by gas, so that they could show their goods against electricity. They could create a magnificent competition, which would do Grimsby good, and make the town even better than it now was. It was a delight to have with them that day two such men as John Terrace and John Kennington. To have worked with men of such calibre was a satisfaction indeed.

"The Town and Trade of Grimsby" was proposed by Mr. BERNARD CLARKE (Stamford), and replied to by the MAYOR, who said he was sorry to hear the Chairman say that his Company had been compelled to increase the price of gas. He himself happened to be a member of the Electricity Department, and, while the cost of coal had been raised to them, they had not increased the price of electricity. The Chairman had told them that they had only seven public gas lights left in Grimsby. Well, he thought they were very lucky to have seven. (Laughter.) He wished to congratulate the President upon having attained the highest position in the Association. He had a very great regard for Col. Kennington, who gave an immense amount of time to social services, for which the town was extremely grateful to him.

Claims of the Supply Side.

Mr. R. ROBERTSON, proposing the toast of "The Association," said that of the great number of invitations he had received during his year of office as President of The Institution of Gas Engineers, those he had prized most had been the invitations to the meetings of the various District Associations. Apart from the pleasure it gave him to meet so many old friends, his visit that day had the added pleasure of enabling him to say that he had visited once every one of the District Associations, including the one in Ireland and the one in Scotland. He had regarded these visits as a contribution which it had been possible for him to make towards the cultivation of the spirit of co-operation which was the basis of the relationship between the Institution and the District Associations. To-day was the day of collective co-operative effort. They had moved some distance in this direction, but not far enough—or, perhaps, not always in the right direction. There had recently been tentative efforts to improve matters from within, and still more recently the unofficial report of P.E.P. had taken the form of an effort to improve the Industry's organization from without. There was doubtless room for improvement, but just as it was said that every country got the Government it deserved, so it might be said that every industry got the organization it deserved; and while it might be interesting to speculate upon what to do about the national organization of the Gas Industry, it would be well to spare a critical thought as to whether the technical interests they represented were being as well served as they might be.

It was hoped that in the future their research work would be carried out in a way that would be worthy of the Industry, and in a way which he thought they would find would enable the District Associations to link-up with the Institution in the promotion of this work. He ventured to suggest that very much was lacking in the direction of education, particularly on the supply side. It was to be regretted that the supply side was not being worthily supported, and the District Associations could lend their assistance in roping in all the young men that they could. Individual undertakings could assist, too, by seeing that their young men took up, not only the production side, but the supply side also. He would make an appeal to those in authority to see that all the young men who were anxious to qualify as all-round engineers should have every opportunity of obtaining the wider knowledge which was so desirable. It was his pleasure to couple with the toast the name of their President, whose works they had that morning enjoyed the privilege of inspecting. He knew that Mr. Terrace was delighted with the improvements that had been carried out since he left Grimsby some twenty years ago.

The PRESIDENT, in the course of his response, pointed out that the Association was strong and active, and he could assure Mr. Robertson that they would support the Institution in every possible way in all its undertakings. The work of the Association was complementary to that of the Institution.

The remaining toast was that of "The Visitors and Press," which was submitted by Mr. G. A. MALLETT (Ipswich), who remarked that among the guests was Mr. W. D. Rowe, Manager of the B.C.G.A. Responses were by Mr. T. A. RICHARDSON, President of the Grimsby and Cleethorpes Rotary Club, and Mr. ALFRED HARRISON, "GAS JOURNAL."

A Well-Filled Day.

While the luncheon and speeches were in progress, the ladies of the party, who had been taken for a short drive, including a visit to Cleethorpes, were entertained at Guy's Café; and in the afternoon members, guests, and ladies proceeded by motor coaches to Tealby, in which delectable spot tea was served—the return journey being made in ample time to allow of suitable preparation for a festive evening.

Most complete arrangements had been made for the annual dinner of the Association, which took place in the Town Hall, and this was followed by dancing in the Assembly Room. The attendance at the dinner numbered close upon 140, and included the Borough Member, Sir Walter Womersley, and many prominent citizens and their ladies. The PRESIDENT was in the chair, and he was supported by Mrs. Kennington. It had been mentioned by him in his Address earlier in the day that Grimsby is happy in possessing a Local Branch of the Women's Gas Council; and among those attending the dinner was Miss Kathleen M. Halpin, the Organizing Secretary of the Council.

In an interval during the proceedings, presentation was made of the prizes which had been won on the previous evening in the Annual Golf Competition on the delightful course of the Grimsby and District Golf Club, at Little Coates. The winners were:

Members' Prizes.—1, Mr. J. Simpson; 2, Mr. M. H. Thornton; 3, Mr. C. E. Wright; 4, Mr. G. A. Mallett; 5, Mr. Williams; and 6, Mr. Williamson.

The Turner Challenge Trophy and replica went to Mr. Mallett.

Perseverance Prize.—Mr. J. H. Rioch.

Non-Members' Prizes.—1, Mr. E. C. Kirkup; 2, Mr. Franklin; and 3, Mr. E. H. Hallows.

Mr. George Wright, of Lincoln, was cordially thanked for

the efficient manner in which he had organized the competition.

DINNER.

The toast of "The Great Grimsby Gas Company" was again honoured at the dinner in the evening. Mr. R. PRINCE (Peterborough), in submitting it, remarked that the Grimsby Gas Company was formed about 1848, and it had never been in a stronger position than it was to-day. It was now ministering to the needs, convenience, and health of some 21,000 consumers, besides indirectly contributing to the amenities of the town by providing a smokeless fuel and tar for the roads. The happy position existing to-day was due to the fact that the Company had been noted for many years for the possession of an excellent and far-seeing Board of Directors, and they also had in the President of the Association an officer whose gifts and abilities as an engineer and administrator were widely acknowledged, and whose services both to the Company and to the town were appreciated to the utmost. The speaker commented upon the generous hospitality that had been extended to the Association by the Grimsby Gas Company.

Lieut.-Col. W. W. SMETHURST, O.B.E., J.P., having made response in humorous vein, the guests were toasted on the proposition of Mr. G. A. MALLETT (Ipswich), who made reference to the large number of distinguished persons present. "Grimsby," he declared, "provides the very best fish, and the Gas Company supply the very best means of cooking it." Acknowledgments were made by Sir WALTER J. WOMERSLEY, J.P., M.P., and Mr. E. KIRMAN.

The President.

Mr. JOHN TERRACE, proposing the toast of "The President," remarked that, though he had been a member of the Eastern Counties Association for thirty years, it was twenty years since he had left the district and taken up his residence outside it. Returning to Grimsby, and being able to contrast things as they were then and as they had become to-day, it was, erhaps, not inappropriate that he should propose this toast. Thirty years ago those responsible for the supply of gas were just beginning to recognize that, if one wanted business, it was necessary to go out and look for it. Well, when he was at Grimsby he looked around for someone to take on this part of the work, and hit upon their President. He experienced a very great amount of pride and pleasure that night in feeling that he was the one who offered John Kennington his first step on the ladder. At that time John Kennington was a very keen Territorial volunteer, and when war was declared he came along and said he had to go. He went to France, and had bestowed upon him the D.S.O., the M.C., and rose to the rank of Colonel. After the war, the President came back, and when he (the speaker) departed from Grimsby a few years later he left him pursuing the even tenor of his way. The Address they had listened to that morning was a plain story, and contained a great amount of valuable information. The way in which the carbonizing plant was operated was a matter upon which the Company were to be congratulated. It placed them in a position in which they were quite independent of the coke market.

The PRESIDENT, responding, said the appreciation that had been shown was ample compensation for anything he had done for the Association. He owed a tremendous amount to Mr. Terrace for the opportunities he had given him, and for his excellent example at all times. To the younger members of the Gas Industry he would say: "Fit and prepare yourselves, so that when the opportunity does come along you may be able to take advantage of it." He hoped that all would carry away happy recollections of their visit to Grimsby.

Fuel Economy in Gas-Works

By LESLIE MUIR WILSON, M.Sc., A.I.C.,
Chief Works Chemist, South Metropolitan Gas Company

A Paper read at a meeting of the Eastern District of the Southern Association of Gas Engineers and Managers.

A question which many gas manufacturers may wish to consider is whether their future carbonizing plant is to be heated by internal or external producers. Like most practical problems, there is no definite "Yes" or "No" to a question like this; the whole thing is entirely a matter of compromise. It is difficult to decide which gives the best value for money in a self-contained unit, but the problem is nearly always complicated still further by the necessity of having to work in conjunction with somewhat out-of-date existing plant. For this reason it is unfruitful to dogmatize upon an unobtainable, although ideal, type of plant, and better to consider a method of reasoning which should be helpful in any circumstances. Thus the quotation of figures which depend on prices of plant and material will be avoided as much as possible. Costs of this nature vary so much that what is right at one time or place may be wrong in another.

The built-in type of producer is well understood and cheap to construct, especially under horizontal retorts which usually require something by way of support, and on a cost for volume basis producers and flues are nearly as cheap as any other kind of brickwork. The fuel consumption is never much better than 15% coke-to-coal ratio and the fuel is run-of-retort-house coke containing the more valuable large sizes. On the other hand, the coke is not so valuable as might be supposed, because it has incurred practically no process costs between pushing out and charging into producers. Because of the rather high fuel consumption, a lot of heat escapes up the stack, and it may be possible to recover some of it as steam in waste-heat boilers. If the steam is wanted this point should be carefully considered, especially on an old site where existing direct-fired boilers will still be available, for waste heat boilers always require some flexible plant to back them up. When the setting goes down, the boilers go with it, and it is impossible to start up on waste heat boilers alone. Waste heat boilers may also produce steam at times when there is no use for it, and then it becomes detrimental to the peace of the neighbourhood. It may even happen that less economical plant has to be kept up during the summer for the sake of the steam produced from the waste heat boilers.

Although such settings send a lot of heat up the stack, it does not follow that it will always be possible to convert much of the heat into steam, for it is impossible to do anything with heat at temperatures below 200° C., and it may so happen that a very large quantity of heat at a low temperature is being passed away, due to a generally leaky state of affairs, or that just as much heat represented by a smaller volume of gas at the useful temperature of 800° C. is available. It follows from this that new settings often give remarkable yields of steam which cannot be maintained under conditions of everyday work, and if too much dependence is placed on the waste heat boilers difficulties over steam shortage will be encountered sooner or later. Again, if the boilers are not to suffer from corrosion troubles they must not be too large for normal work so that during times of heavy gasmaking they are apt to form a bottle neck.

Financial Aspect.

The financial aspect of fuel consumption in retort houses is very difficult to gauge, because so much depends upon the value of different grades of fuel which vary with time and locality. Up to a fuel consumption of 12% coke-to-coal ratio the fuel burned, if only the poorer grades are selected, is mainly scalpings. But all fuel in excess of this figure must needs be obtained by drawing upon good coke which shows why heavy fuel consumptions are disproportionately expensive.

A house of horizontals doing 10-hour work on a 15% coke-to-coal ratio or a fuel consumption of 1,800 B.Th.U. per lb. of coal and carbonizing 82,000 tons per annum should raise about 5,500 lb. of useful waste heat steam per hour. If the same amount of coal could be carbonized by another method involving a fuel consumption of only 10% or 1,200 B.Th.U. per lb. of coal carbonized, there would be a saving of 4,100 tons of fuel per annum for heating, but no steam would be raised. Then it follows, if the old type of setting is purposely retained for its power to produce waste heat steam, that we are burning 4,100 tons of fuel in the production of $48{\cdot}5 \times 10^6$ lb. of steam per annum and that the efficiency of steam production is only of the order of 52%. The

steam must still be raised, but it should be possible to do this at an efficiency of 70% in modern independent plant, and this will only need 3,044 tons of coke fuel of the lowest grade, even if we take no credit for the fact that a lot of the waste heat steam was raised perhaps when it was not wanted. Thus we have a total fuel consumption of

8,200 tons per annum for settings,
3,044 tons per annum for boilers,

Total 11,244 tons,

as against

15% of 82,000 tons = 12,400 tons.

The annual saving is thus 1,156 tons of best grade coke which may be worth as much as 30s. per ton at works, in which case the annual saving will be at least £1,734. But this is not the whole story by any means, because in the old waste heat plant, where no heat recovery from the waste gas to the incoming gas and air was attempted, there was some breeze produced which only contributed about 2s. per ton of breeze to revenue after all expenses had been paid. This breeze and the scalping are now used up by outside producers and under independently fired boilers, releasing an equivalent quantity of good coke for sale. The total coke and breeze from 82,000 tons of coal would be about 58,040 tons. Of this, the waste heat plant would burn about 12,400 tons (15% of 82,000) in producers, leaving 45,640 tons for sale, which would contain about 12% of breeze and scalpings, or about 5,400 tons. But on the outside producer plant there would be no scalpings or breeze for sale, so if this is valued at, say, the very debatable price of 20s. per ton, for it is not all breeze, we get an additional saving of £2,700 per annum, which represents the difference between 5,400 tons at 30s. against 20s., making a total of £4,434 per annum.

Inbuilt Producers.

As far as inbuilt producers are concerned, they do not require to be operated or constructed with any very special care, and so long as gas is prevented from blowing away round the charging holes and they are kept well filled and not more than 35% of carbon is taken away with the ash, fairly reasonable results may be obtained. Should the quality of the gas deteriorate down to as much as 6% of carbon dioxide, little heat is wasted, as the gas enters the setting so much hotter. Extreme care should, however, be taken to see that a good waste gas is obtained in the setting. This ease of operation and the cheapness of construction are all points which commend this type of plant to smaller works with a limited capital and a small technical staff.

On the other hand, inside producers have their limitations, especially in big units. The producer has usually to go out for repair before the setting, and its own thermal movements do not add to the stability of the structure above. They produce a dusty gas, which is the cause of most of the brickwork wastage and other trouble in the settings, probably reducing their life by as much as ten years and making it necessary to close down several times during their existence. They do not lend themselves to the design of a type of carbonizing unit on which it is possible to obtain the highest thermal economy, and this is a very important matter.

It is often argued that if a unit could be made to go for ten or twenty years without letting down no benefit would accrue because the nature of gas companies' business is such that as much as 50% of the plant may not be required in the summer. But if the plant is so economical that as much as 50% of the heat output of the producers is employed in the carbonizing process, it may well happen that only a very small proportion of the usual hourly heat consumption will be required to keep the internal structure at just above 600° C., which is about the bottom limit temperature to which silica material should be reduced if contraction troubles are to be avoided. This is one fortunate respect in which silica differs from fireclay; an examination of the expansion curve for this material shows a remarkable flattening out from 600° C. upwards. Though silica has the reputation for being a very delicate material, this only applies at low temperatures; at high temperatures it is remarkably robust, as anyone must realize who has seen dripping wet washed coal being charged into some coke ovens or who has seen an open hearth furnace put on full gas as soon as a red heat has been gradually worked up to. This has been confirmed on a horizontal retort setting which was made to carbonize coal at almost top speed within about 12 hours of having been at 600° C. Careful expansion measurements revealed no change of the structural dimensions from this temperature of 600° C. upwards.

Keeping Plant Under Fire.

On account of the fact that it is possible to keep certain types of plant sufficiently warm to avoid trouble with so little loss of heat, it is evident that the fuel which would be used for heating from cold could, if used in this way instead, be made to extend over a much longer period than formerly. At least one coke oven plant was kept warm over the six months of the 1926 coal strike and the actual fuel consumption was little different to what would have been required to restart the battery, and there were no attendant firing expenses. The greatest gain of all, however, was that when the strike was over the plant was able to earn money immediately and at a time when coke was dear because most of its competitors needed a couple of months to get going again. This factor of flexibility is worth a lot of money in itself to gas-works, for no one knows just when the load is coming on.

The outside type of producer is thermally less economical than the built-in type and must be worked and designed with great care to give good results. Therefore, if it is worked with the ordinary not very economical horizontal retort setting, the results are apt to be disappointing. A built-in producer supplying hot gas can be 95% efficient, but an efficiency over 80% from an outside producer on cold gas is remarkable. So any type of carbonizing unit which requires outside producers for its operation must be a great advance on horizontal retorts if there is to be a gain in overall economy.

The most efficient method of recovering waste heat is by means of reversible regenerators, and fortunately their efficiency is in no way affected if they are supplied with cold gas, because higher gas temperatures mean higher regenerator bottom temperatures, which lead to an equivalent increase of waste gas temperatures. If a producer is blown with air only, less than 66% of the available heat can be present in the cold carbon monoxide formed, but if steam is admitted with the air a great deal of the heat which would otherwise be liberated can be used to convert the steam into water gas, with the result that in practice it is possible to convert as much as 85% of the available heat of the coke into chemical heat available from combustible gases. The best results appear to be obtained when the air blast is saturated at 56° C. Above this figure the hydrogen still tends to increase a little, but the carbon monoxide falls off so much as to cause the performance to go back. When a gas producer is worked under the best possible conditions the gases still come away at a temperature of approximately 650° C., which accounts for the major loss of efficiency. The gases have to be cooled, and this is best done in two stages, first by passing them through a boiler and secondly in some type of scrubber. This method is economical in cooling water and produces twice as much steam as is necessary to blow the fire and saturate the blast; thus this steam heat does not need to be deducted from the economy of the process and there should be a good credit on this account. If the steam is supplied from some other source, the heat used in its production must be deducted before arriving at the efficiency figure.

There is one word of warning necessary when considering external producers in conjunction with reversible regenerators. When the coke is quenched with tidal river water containing sodium chloride the salt is volatilized in the producers and passes on with the gas; for some reason it seems able to escape removal in the subsequent washing and passes on into the combustion zone, where it is heated in the presence of hydrogen sulphide contained in the gas. Under these conditions of continually changing atmosphere the strong but more volatile HCl escapes from the system, leaving behind Na_2SO_3, which is immediately oxidized to Na_2SO_4. This salt condenses at about 600° C. halfway down the regenerators and after a few months blocks them up.

If the coke is quenched with suitable water or is dry cooled there can be no trouble. On the other hand, were the hydro-

gen sulphide removed from the gas, this trouble would be staved off for much longer. This will be discussed later.

Behaviour of Ash in Producers.

It is never easy to make really good gas as low as, say, 3% carbon dioxide when serious clinker trouble is encountered. On metallurgical plants where coal is bought especially for the gas producers, great care is taken over its selection so that the ash is as refractory as possible under producer conditions; other factors are usually regarded as being of secondary importance. Fortunately coals which run high in sulphur are never desirable for metallurgical work and they usually produce clinker, due to the reducing effect of the sulphur and carbon monoxide, which favours the formation of fusible ferrous silicates, the iron, of course, being derived from the primary pyrites. By laboratory methods it is extremely difficult to predict what the exact behaviour of any ash will be in a gas producer, and it is well known that the addition of traces of different substances in various degrees of sub-division can change the properties of ash very largely. Since so much of the coal ash is extraneous matter, it is not surprising that very conflicting results are met with from the same coal, especially when it is mined from the thin seams which are typical in County Durham, but when different coals are to be mixed in all proportions, the problem becomes quite hopeless. The best solution for a gas company seems to be that only coals which show absolutely unreasonable results in practice should be ruled out. It should be remembered that a coal which was once good in this respect can rapidly deteriorate, due to the speed with which narrow seams can be worked through, and conversely bad coals may improve. But generally it is wisest to make the best of what comes to hand because the coals must be purchased primarily on account of their propensity for making good, cheap coal gas. Fortunately the high rate of steaming which produces the best producer gas keeps clinker formation at a minimum, due to the cooling effect of the steam in the reaction zone. Pouring water on the bars of producers is a practice which has little to commend it, because it allows no control over the moisture actually reaching the reaction zone, although it may be necessary for half an hour or so after clinkering in order to preserve the bars while burning coke is still in contact with them. In the case of the more modern barless producers, the question does not arise.

On account of the following facts it may appear that there is no case for the outside producer. It is essential to make very good gas in it, and this needs skilled technical supervision which small works at least cannot afford; it is more expensive to install; it costs more to handle fuel into it, and a fair proportion of the sensible heat in the gas and all the sensible heat of the discharged coke will escape recovery. But there is another side to the picture which has been very much neglected, and it is that it opens the way for a carbonizing unit which is very much more economical thermally and instead of taking run-of-retort-house fuel which contains the cheapest mixed with the most valuable sizes of coke, it is possible to feed it entirely with coke selected on account of its comparatively low value, and there is usually enough between ½ in. and 2 in. to suffice. There are independently gas-fired plants working to-day where the fuel consumption is below 900 B.Th.U. per lb. of coal carbonized. When they are fired with producer gas made with an efficiency of 80%, this is equivalent to an overall fuel consumption of 1,120 B.Th.U. per lb. of coal carbonized, whereas the very best horizontal retort practice seldom shows figures better than 1,800 B.Th.U. per lb. of coal carbonized. It is therefore permissible to embark on considerable capital expenditure so as to obtain a reduction in fuel consumption of the order of 37%, and even greater financial savings due to the low grade fuel which can be employed, bearing in mind that the hot producer gas raises nearly as much steam as the resulting hot waste gases would do.

It is now necessary to explain why it is that one type of carbonizing plant may be so much more efficient than another.

Heat Losses Analyzed.

The major way of escape for heat from carbonizing plant is up the stack, but it is unsatisfactory to regard this as one of the main headings under which heat is lost. For instance, were radiation reduced, particularly from mouthpieces, so would be the fuel required to overcome this loss and less heat would be wasted up the stack. Again, if 560 B.Th.U. have to pass through the carbonizing chamber walls and be absorbed by each lb. of the charge in order to effect carbonization, then a definite amount of waste gas produced by the fuel gas which provided the 560 B.Th.U. must escape at some ascertainable temperature to atmosphere. If temperatures are maintained, but carbonization ceases, not only will the loss of 560 B.Th.U. to the charge cease but also will this complementary loss to the stack. By treating all losses in turn in this manner, it soon becomes apparent that if every loss gets its proper share of the blame, there is nothing left over for stack losses, and what was once regarded as a major source of waste is really the sum total of parts of several things.

On the other hand, it is inevitable that gases should leave the heating surfaces of carbonizing plant at a temperature at least equal to the temperature of the surfaces and if allowed to escape to atmosphere in this condition will be responsible for a very great loss of heat. So much so that the plant will require two or three times as much heat for its operation as would be necessary if a really modern method of gathering this heat back into the plant were employed. This heat can be made use of indirectly, though not efficiently, for steam raising, but on large or even moderate sized plants it can easily be shown that if all the carbonizing plant were arranged in this way, the amount of steam raised would be too colossal to contemplate. Where people have made small new additions to existing old plant, the steam raised has been welcome, but it will be another story when it comes to renewing the remainder of the plant, and even under these easy conditions it seldom pays to have plant of higher fuel consumption than absolutely necessary. Too many waste heat boilers on a plant can be a nuisance on account of their inflexibility and the fact that when a setting goes off, so much boiler plant goes with it.

It is therefore better and will soon be inevitable that the waste heat be recovered for use in the plant itself. For years past there have been two rival ways of attempting to do this. One which appeals most at first sight and seems most favoured by the Gas Industry is the counterflow recuperator. The other is the change-over regenerator working on the Siemens-Martin principle, similar to the Cowper stove, and it is this principle which seems to have established itself firmly throughout the rest of the industrial world. It would therefore be interesting to devote a little time to considering these two rival principles. The recuperator is, of course, the theoretical ideal for the recovery of heat, although not perhaps for the working of the furnace. It need not be expensive to construct nor need it have a lot of expensive valves and other fittings, and for some varieties of furnaces, such as continuous types like vertical retorts and billet reheaters, it can yield a suitably graduated heating zone. The main difficulty is to find a form of construction and material which do not permit the air and gas to escape on to the waste gas side and be lost directly up the stack. This trouble is made more difficult due to the fact that it is normally necessary to have considerable differences in pressure between the reagents and the products; also because the chambers must be made of some material other than metal. It is nearly always impossible to keep refractories gastight in the complete absence of retort carbon and the partitions through which heat has to be transmitted must be thick and of a substance which does not conduct heat too well.

Disappointing Results from Recuperators.

As a result of experience, by comparing recuperators with regenerators and by measuring the outlet temperature in each case on structures of similar cost, I have formed the opinion that the results obtained from recuperators are generally most disappointing and that they rapidly deteriorate. Generally speaking, a recuperator seldom seems to be capable of reducing a waste gas temperature of 950° C. to much below 600° C. provided that the gas analysis remains constant, which is by no means usual, but with regenerators of the same volume it is possible to get a drop from 1,100° C. to 330° C. But, what is more important, these results can be confirmed by the fuel consumption. One of the reasons why

recuperators die so hard is that in these scientific days people are disinclined to accept the bare fact that the fuel consumptions differ, but must know why. This attitude is right, but it does not justify the mind that denies the existence of the obvious until it can be explained, nor does it make any more welcome those research workers who lack the moral courage to admit that they do not know but must proceed to prove that they do not by displaying their dismal ignorance of the natural laws.

Certainly after careful consideration of the two systems one would not expect the recuperators to show up very well if only on account of the difficulty of transmitting heat through thick brickwork. But it is good to be able to confirm one's suspicions by measurement, and herein lies a great difficulty which is bound up with the leakage of the recuperator. The temperature at the outlet of the recuperator may be satisfactorily low. In these circumstances it may be found that the waste gas analysis between inlet and outlet has changed so as to show a considerable increase in the oxygen content. By converting the increase of oxygen into terms of cold air it is possible to calculate what the outlet temperature would have been had the air been excluded. In one bad instance in mind the calculated outlet temperature came out higher than the inlet temperature, the inference being that the free oxygen measured represented only a portion of the total air which had leaked in, the rest having combined with fuel gas which had been leaking simultaneously; thus the heat recovery apparatus was in reality a furnace. Therefore, it is not safe to assume that if the waste gases show an increase of oxygen there has been no loss of gas. A waste gas may appear perfectly normal when gas and air are leaking heavily but in their correct proportions. The real difficulty is that investigations of this nature give no direct key to the magnitude of the losses.

When we turn our thoughts to the change-over regenerator we have quite a different principle to consider. There is no longer an exchange of heat between two fluids in a continuous state of counterflow and the process becomes an intermittent one, which, of course, has its drawbacks. The principle is to heat a mass of refractory material with the waste gases for a period and then during a similar period the fluid to be preheated is passed through the mass in the opposite direction. On a furnace there are two similar masses, and while one is absorbing heat from the waste products the other is delivering its heat to the reagents. The furnace is equipped with a double set of gas and air ports, working turn-about. One set supplies the reagents and the other takes away the waste products until the whole system is reversed after an interval of, say, 30 minutes. It is most satisfactory to install the regenerator masses below the furnace where advantage can be taken of the natural buoyancy of the hot gases, and in carbonizing practice this procedure simplifies the even distribution of the reagents over the surfaces to be heated.

It may be thought that the rapid change from hot to cold in the regenerators would give expansion troubles, but the surfaces of the heated materials only are drawn upon to supply heat, and it is doubtful if any change in temperature takes place below $\frac{1}{8}$ in., and the local changes of temperature are only of a very small magnitude, since on reversal the dead-cold gas first comes in contact with the coldest zone at the bottom. Because the surfaces only are drawn upon to supply heat it is necessary to fill the regenerator chambers with lumps which will expose the maximum surface for volume employed, and with this object in view it is also well to arrange for as many changes in direction as possible while choosing a suitable spacing. A satisfactory filling can be made up of fireclay shapes built-in checkerwise, but there is no need to dwell on details of this kind, which are standard practice.

Advantages of Regenerators.

For carbonizing work the regenerators have a great advantage over recuperators from a purely thermal point of view, but they have the additional advantage of making it possible to design a far more efficient furnace for the treatment of static charges.

In the uni-directional furnaces of horizontal retort settings the temperature of the gases falls from, say, 1,350° C. in the combustion chamber to 950° C. at the jack arch. If the temperature could be 1,350° C. in all parts of a fireclay structure, the rate of carbonization would be decreased from, say. 12 to 8 hours and the rate of radiation loss would be elevated slightly, but despite this the fuel consumption ratio of the setting proper would be vastly improved due to the increased throughput; but if a temperature of 1,350° C. were maintained at the jack arch it is doubtful if any recuperators could be made capable of recovering heat at that temperature. However, with a reversing furnace it is quite possible to maintain 1,350° C. on the combustion side, falling away to 1,200° C. on the outgoing side with an exactly similar temperature diagram on reversal. Superimposition of the two diagrams shows that it is possible to maintain an even mean temperature of, say, 1,280° C. all the time, or any other even mean rate of heating which the refractories will bear. The increased throughput compensates for the higher capital cost per unit and there is a definite saving due to the lower thermal losses per ton throughput from the setting and from the heat recovery system. Because regeneration can function so economically on cold gas the road is open to the use of clean producer gas, which should make it possible to work the plant for twenty years without letting down, if need be.

A great deal of the damage suffered by carbonizing plant is due to the effects of ash fusion. The ash fuses with the refractories causing wastage and pitting, and spoils the shape of the nostrils, with the result that some are soon too small and others too large, which gives rise to excessive local heating. A clean gas can be delivered under a reasonable pressure which facilitates distribution between the settings, and so long as the nostril sizes are accurately graduated they keep true to size, and the even distribution of heat in the same plane and at right angles to the direction of gas flow is ensured, with the result that heat is not so apt to be wasted in over-carbonizing one portion of the charge while another portion is still green. It follows also that the distribution of volatile therms through the coke becomes more constant. There are carbonizing plants to-day which have been working on clean gas for twenty years and the combustion zones in them look as good as new, although they have never been repaired or even let down; and plant which has gone without repair for twenty years is a very much cheaper proposition than one which has had many repairs in ten years of life.

Lastly, if gas is cool and clean it can be purified of substances other than dust. There is no doubt that the day is upon us when for new plant at least we shall be expected to discharge a sulphur-free effluent into the atmosphere. To cool and clean the chimney gases is an enormously expensive business and seems likely to work out at between 2s. and 5s. per ton of coke used in producers, even when large quantities of suitable, slightly alkaline water are available. A simpler and cheaper method is to deal with the relatively smaller volume of cold producer gas in which sulphur is held in the fairly tractable form of hydrogen sulphide. Hot producer gas also contains volatilized elemental sulphur. There would be no need to remove hydrogen sulphide down to the fine standard required for town gas which would greatly reduce the cost of the operation and might even render it possible to make it a paying process on account of the value of the sulphur removed. A figure of. say, 0·10 gr. per cu.ft. would certainly suffice. Little or no work seems to have been done on this problem yet, but there is no doubt that the operation would be a cheap one. The question is how cheap it can be made. It certainly seems that while we are endeavouring to put our consumers' houses in order in respect of smoke and dirt, we should not neglect our own.

It seems that it requires about 560 B.Th.U. to carbonize 1 lb. of coal, this heat being absorbed by the coke carried away by the volatile products and used to effect the chemical changes involved. In practice figures as low as 900 B.Th.U. per lb. of coal carbonized have been recorded, exclusive of producer losses; the low fuel consumption has not been obtained by enormous capital expenditure, being only of the order of 6s. 8d. per ton of coal carbonized per annum for the carbonizing unit only. Such results are evidence that we are getting very much nearer the ideal than was once supposed possible. These figures apply to plants which burn a proportion of their own coal gas, but when they are fired with producer gas the capital cost would hardly be increased above 8s. per ton of coal carbonized per annum nor would the fuel consumption be increased above 1,130 B.Th.U.

Fuel consumptions of this order are well worth striving for, because when coke is saved on the works it is the most expensive grades which are saved first.

It may be well to touch on the contentious question of steaming in carbonizing plant, only briefly though, because so much has already been said and written on this subject. But there are factors which must be borne in mind when considering new plant in this connexion. First, when steaming of static charges is indulged in, the coke must stay in the plant longer; this means a higher capital cost per ton of coal carbonized, also extra boiler plant must be installed with similar results. So the charge for amortization and maintenance of all the extra plant must be put against all the extra therms made by steaming, also they must be debited with the coke used to raise the steam and with the coke decomposed by the steam *in situ*. It is no good arguing that the steam costs nothing because it comes from waste heat boilers, just after having argued that waste heat boilers could be justified because the steam would be wanted for steaming.

Use of Steam on Works.

No review of fuel economy is complete without reference to the use of steam on a works. It is all very well to raise steam economically, but it is just as necessary to use the steam effectively after it has been produced.

An ideal way of treating the direct raised high-pressure steam is to pass it all through one large steam engine capable of driving the whole establishment by direct and electric transmission, to condense it in a surface condenser of the regenerative type, in which the condensate is pumped back against the condensing vapours, so as to arrive again at the boilers at practically boiler temperature and pressure. This brings about the advantage that the boilers are constantly supplied with hot oxygen-free water of zero hardness, since the make-up can be bled in as steam from other boilers. A turbine set of 600 H.P. should be able to produce one electrical H.P. hour for the expenditure of 10 lb. of steam. This machine should be built into an in-line set comprising an alternator, the exhauster and a booster for the producer gas, along with condenser circulating water pumps. This yields the advantage of one really large economical prime mover which is relatively shielded from the fluctuations of a purely electrical load. The whole set has to revolve at constant speed so as to maintain periodicity, but this is of no disadvantage to the exhauster or blower if their loading is governed by an automatic device on the gas inlet designed to maintain a predetermined positive or negative pressure. In fact, if the exhauster is to remove tar fog efficiently it must be run at constant speed. This arrangement is more reliable, being free from electrical trouble and free from dynamic inertia under changing loads, and more economical than indirect electric drive for the large machines; also the saving in cost is so great as to permit three sets of this type to be installed which gives complete immunity from breakdown of gas supply. With only two sets one can go wrong while another is under repair. To comply with Home Office requirements the electrical end of the set must be isolated from the gas end by a suitable bulkhead.

Next to direct drive from a big prime mover, electric transmission is most economical, especially when distance has to be considered. So the rest of the machinery, except that to which sudden though momentary stoppage might be disastrous, should be electrically driven.

The prime mover with its boilers should form a separate unit, only drawing sufficient steam from the waste heat producer gas boilers or other low-pressure boilers to ensure that water losses from the system are made up. This should not exceed 2% of the water evaporated and obviates all scale trouble in the H.P. boilers, superheaters, or on the turbine blades.

If outside gas producers are used they should produce enough steam from their own waste-heat boilers to supply themselves and the benzole plant, the whole of which will be irrecoverable as condensate and therefore entails a fairly large water softening plant. The most satisfactory way of blowing producers is by steam jet blowers. They can be made silent, but, of course, are not very efficient, but it is necessary to add 0·46 lb. of steam per lb. of coke gasified to the blast for saturation purposes, so mechanical efficiency is of no moment here.

All this steam can be efficiently raised at relatively low pressure, which is one of the advantages of a separate installation; the make-up steam to the high-pressure system can be introduced at the low-pressure end of the turbine.

To give the low-pressure system flexibility it might contain one direct-fired boiler. This would be best direct-fired with producer gas and the gas regulator automatically controlled by the steam pressure.

If water gas is to be made the extra boilers which will have to be included are usually part of the plant, but the fuel economy of water gas production coupled with the capital cost of the plant is so large and contentious a question that it cannot be considered here. There is, however, a strong case for a flexible carbonizing plant capable of supplying the district with a gas of constant composition, and such a plant is no longer an unattainable ideal or so expensive to run and maintain as may be imagined. Provided the carbonizing plant is really economical in fuel it costs very little to keep it hot when not carbonizing coal and it is always ready at a moment's notice. Some people even run a fair proportion of their water gas plant continuously through the winter, in which case the whole installation cannot be fairly regarded as stand-by.

Coke Scalping.

A note on the subject of scalping coke may be of value before closing. The logic of scalping seems to lie in the belief that the majority of the shale in the coke is to be found in the smaller sizes—say, up to 2 in. The process is unsatisfactory in practice because a great deal of the shale is found in the other sizes too. It has even been suggested that the coke ought to be cleaned. To anyone with experience of coke handling and coal cleaning this sounds a dreadful business, partly because a lot of the coke and shale are cemented together and partly because it must be effected by dry cleaning. An abrasive substance like coke will surely tear any dry cleaning plant to pieces in a short time, but it does seem extraordinary to think on these lines when the coal itself can be so easily and effectively cleaned.

If it is not possible to get this done at the colliery and so save transport costs on useless material, why not do it at the works? It would at least save the expense of heating up and quenching rubbish but should make it possible to use a smaller number of units for the same make. Further, the smaller sizes of coke which contain the most volatile therms would be clean enough for the market and it would no longer be necessary to make extra breeze by wearing out a breaker plant in order to replace valuable small coke which has been got rid of as scalpings. People have even been known to argue that it would be difficult to dispose of the refuse from the cleaning plant; this refuse now appears in their boiler and producer clinkers, which are presumably removed. But perhaps they are afraid that the refuse might be pyrophoric; this is a real but not insuperable difficulty. There are efficient coal breakers on the market to-day which give a partial separation on the principle that coal is more readily broken than shale. These breakers are extremely light in maintenance and certainly constitute a step in the right direction for those who do not want to go the whole way with a coal cleaning plant. Incidentally they throw out tramp iron and wood just as readily as shale.

There is no need here to go into lengthy calculations on the costs of the rival merits of coke *versus* coal cleaning as these vary very much in accordance with the size of the plant, the type of coal used, and proximity to the pits, but it is an instructive calculation which everyone can do for himself, and the process of enquiry cannot fail to be as entertaining as the answer arrived at.

A summary of a few of the important factors to be considered when contemplating new carbonizing plant seems to be as under:

(1) Total fuel used for carbonization and steam raising.
(2) The value of the fuel.
(3) Capital cost of the plant.
(4) Length of life of the plant.
(5) Cost of maintaining the plant.
(6) The quality and quantity of:
  (*a*) The coal gas and volatile products.
  (*b*) The solid products.
  (*c*) Chimney and other effluents.

Management of Gas Undertakings

by

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We publish below a report of the discussion which followed Mr. Gill's Paper (given in last week's issue) to the Wales and Monmouthshire Association of Gas Engineers and Managers at their Annual General Meeting on May 25.

Mr. W. Morland Fox (London) said that to him there were two points of interest in the Paper. The first of these concerned the holder control diagram given by the Author. In that diagram the inlet and outlet pipes to the holders were shown to be diametrically opposed at 180°, whereas in his experience they were usually arranged side by side. He wondered whether Mr. Gill's scheme would be as successful with side by side arrangement. Then, on the question of the quality of coke, he had come across cases where it was not policy to import coal of more suitable gas-making characteristics into a district. He wondered would it not be practicable for such an undertaking, using inferior coal of a high ash content, to grade the coke produced, reserving smalls and inferior coke for use on the works, and cutting and regrading the larger coke so as to produce a fuel of an ash content approaching, and not appreciably greater than, that of the original coal.

Mr. H. Matterface spoke as one having had a long association with works of 20 to 25 million cu.ft. per annum output. He had found it was essential to start early in the morning, and see that everything was in order and that a definite task was given to each man before setting about one's own work. The delegation of a particular task to one man was more necessary to-day than ever before. He asked Mr. Gill if the continuous reading of meters meant four times a year or more frequently.

Mr. H. D. Madden (Cardiff) characterized the Paper as Mr. Gill's *credo* of the way in which he ran undertakings under his control, and he found himself in whole-hearted agreement with the points mentioned in the Paper. At Cardiff they ran on similar lines to those mentioned in the Paper, and Mr. Gill's point regarding constant quality was most important. Twenty years ago he recalled a suggestion at an Institution meeting that one B.Th.U. was as good as another, but he remarked that it depended upon the company they kept! It was so important to-day that gravity should be kept constant. Regarding meters, their practice was to bring them in every ten years, when they reconstructed them, and they found that it reduced unaccounted-for gas. Their practice when putting in a service was to have it wrapped and to soak the inside with heavy oil, thus preventing rust. He thought the man in the street had a better opinion of the Gas Industry to-day than ten years ago, and he would like to pay a tribute to the appliance makers, for their products were truly ornaments in the home to-day. He was also of the opinion that Coke Associations were most important. They now had their Gas Coke Export Committee in South Wales, and they had got closer to the coke oven interests regarding markets and the maintenance of prices, and he thought they would, in the future, work more together to keep up the quality as well as the price of coke.

Mr. W. Clark Jackson (Neath) suggested that the Paper would better have been called a symposium on how to conduct a gas undertaking. It occurred to him that put into small booklet form it would be a very desirable thing to hand copies over to every pupil in the Industry. Mr. Gill had systematically gone through every section of a day's work and had set forth his own opinion as to how it should be done. He made bold to say that if every manager conscientiously carried out what was in the Paper the Industry would be in a substantially better position than it was to-day. Regarding systematic inspection, he had early made it his practice to set aside a special day for inspection of plant and this had been carried out by him up to the present day. Now, of course, he received reports from his assistants, and by doing that one almost insured oneself against serious breakdown. Cost of repairs and maintenance prompted him to stress the importance of itemizing for every section of their plant, for, had they no detailed costing system, it would be impossible to find weak points of the plant. He was also very keen on charts for gas-making, gas going to the district, steam charts on producers, &c., and he found this brought about co-operation of men on the plant because they could not get away from the recordings of the chart. They had tried at Neath to specialize on coke; they used washed coals and they had not sold a pound of coke outside their district for the past twenty years. Regarding the inspection of meters, he recalled his early days with Messrs. Bruce Anderson, who had their meters coloured differently for every year over a seven-year period. This enabled meters of a certain vintage to be brought in for inspection when their time was due.

A Thorough Card System.

Mr. W. T. Kenshole (Merthyr) said that if they carried out all the suggestions made by Mr. Gill it would lead to greater efficiency of their undertakings and much better service to their consumers, which, of course, was their ultimate aim. When he was articled, Mr. Jackson was his superior, and well he remembered carrying out detailed inspection of all the plant on the works. This was very good experience, and later when he was engaged on a very large works he was responsible for the institution of a card-system for all the plant which was so thorough that they were even enabled to know when attention had last been paid to any ring-oil bearing. Anything they could to to reduce district maintenance costs would be more than repaid in years to come. He took it that the majority of them used Short's Indicator for the detection of leakage. There were a number of devices for this purpose and he wondered if Mr. Gill could suggest the best to use for the detection of leakage. In works distributing dry gas, the syphon pot was a wonderful means of tracing leakages, for if a syphon were constantly making water it was an easy matter to get at the source of the trouble if one's records had been properly kept up.

Mr. James Rounds (Bilston) wondered whether the delegation of a particular task to one man would not tend to kill initiative and discourage a man from aspiring to something higher.

Mr. C. H. Chester (Swindon) said that the points set out in the Paper by Mr. Gill reflected a salient feature of the holding company movement. That was, without in any way saying that smaller companies had not been properly run before their acquisition, the holding company found by reason of its size and resources it could put in management which gave a better tone to the undertaking—a very important feature. The first point that interested him was the systematic record of inspection. Every undertaking should have a log-book, which they had found at Swindon to be most useful. The same thing applied to a census of gas appliances, which he stressed should be used intelligently by the maintenance and canvassing staff of an undertaking. His Company had taken over six or seven undertakings and in all cases but one the introduction of such methods as those outlined by Mr. Gill had resulted in the doubling of output. They were also able to offer to consumers good advice regarding the installation of appliances. On the question of tariffs, he claimed to have introduced "half-price gas" seven years ago. In these days of reduced consumption per consumer the tariff was the only reply. At Swindon, for example, they had increased the average from 11,000 to 20,000 cu.ft. in recent years, and he put that down to the two-part tariff and the intelligent use of the census system by the canvassers. The census system was in force in all their undertakings, and the increases during the past quarter were almost uniformly between 9 and 10%. In conclusion, Mr. Chester referred to pipe corrosion problems he had experienced, stressing the necessity for every undertaking to have a knowledge of the sub-soil in its area of supply.

Mr. J. Robb (Chepstow) wished to refute the implication that the smaller undertakings—that is, those of 20 million cu.ft. a year and less, were not so efficiently run as larger ones.

Mr. Gill's Reply.

The **Author,** in the course of his reply to the discussion, said that Mr. Fox had asked whether it was usual in practice to find the inlet and outlet of holders on opposite sides of the holder as shown in the sketch included in the Paper. During the past fifteen years or so it had been customary for the holders to be built with the inlet and outlet pipes arranged in this way. This was obviously much the better practice. Prior to that time, it had been the practice—and, he suggested, a bad one—to place the inlets and outlets side by side, doubtless due to cheaper construction. This had had the effect of greatly reducing the value

of the holder from a gas-making standpoint. In some old holders on Works in the Severn Valley group, the Corporation had altered the position of the inlet and outlet pipes in holders under overhaul in cases where these had been side by side and had taken the outlet pipe to the opposite side of the tank to obtain better mixing. At the same time, if the system outlined in the Paper of using two holders for mixing the gas before supplying it to the district were to be adopted, the mixing effect was likely to be reasonably satisfactory, even if the two holders had their inlets and outlets side by side, and certainly a great improvement on the result obtained when working in and out of one holder whatever the arrangement of its inlet and outlet pipes. Working in and out of one holder was not good practice, and when adopted the quality of the gas supplied to the district was likely, unless continuous verticals are in use, to be very variable and this should definitely be avoided if humanly possible. Mr. Fox had suggested that coke if made from high ash coal might still be reasonably satisfactory fuel provided that it was properly graded and free from dust and excessive moisture, but Mr. Gill was inclined to disagree that coke with a high ash content, say, over 15%, could be satisfactory to any user, however good it might be in other respects. He admitted that some gas undertakings were justified in using high ash coals but this inevitably meant that they had thereby to sacrifice something in the return from residuals.

He gathered that Mr. Matterface more or less agreed with the views set out in the Paper; he had asked whether the continuous reading of meters would mean that these would have to be read and collected four times a year or more frequently. In advocating continuous meter reading, Mr. Gill said he would propose that normally the ordinary meters would be read and slot meters collected four times a year.

He was very glad to have Mr. Madden's comments. He had stressed the great importance, with which Mr. Gill thoroughly agreed, of the maintenance of the specific gravity of the gas at a steady level at all times. The Cardiff system of soaking the inside of service pipes with heavy oil was a good tip and the Author was sure it could be adopted with advantage. He fully agreed with all Mr. Madden's valuable comments.

Mr. Jackson's views also were always of value. He had explained that a systematic inspection had been adopted with advantage at Neath. His suggestion that in connexion with repairs and maintenance expenditure costing was important was very much to the point. It was so large an item and the Manager could not appreciate the true position unless he was assisted by a system of costing which as Mr. Jackson had suggested need not be elaborate, but it should be such as would give him a clear view of where the money was being spent. He was glad to have this suggestion. Again, Mr. Jackson had stressed the great value of charts with which Mr. Gill thoroughly agreed. Well-arranged charts were of the greatest value and showed clearly and truly the actual state of affairs which was so important if the Manager was to keep his finger on the pulse of the daily and periodical workings of his Undertaking. He was glad to have Mr. Jackson's confirmation that it was possible to sell largely increased quantities of coke, given the necessary energy, when this might be necessary arising, possibly, from the installation of a benzole plant or to making more gas to supply a large industrial user. He did not think that they ought to feel that if they had to make considerably more coke than in the past it would be impossible to sell it at a satisfactory price. As in Mr. Jackson's case, it was a question of the energy and application to the problem in hand.

The Detection of Leakage.

Mr. Kenshole had referred to the best methods of detecting leakage on the district and had asked for the best means of dealing with this. At Cannock where mining subsidence was extensive the regular methods of detecting leakage were:

(1) To depute a special man to patrol the district searching for indications of subsidence or damage to grass or other vegetation in the proximity of mains and to keep in close touch with opposite numbers in the Water and Sewerage Undertakings.

(2) To search in the usual way with hammer and bar and using a Short's leakage indicator.

(3) To bag off and test sections of mains with small test meter.

It had been found that where a definite leakage was suspected, it was difficult to improve upon the bar method. In cases where mains were to be laid in a mining district Mr. Gill said his Companies had come to the conclusion that the best method was to weld three lengths of steel main together followed by a Dresser coupling and then a further three lengths of welded main, and so on. This had the advantage of providing an expansion joint over 30 to 40 yd., while this method on, say, a 6-in. main provided for a movement over this length of about 2 in., either compression or tension. It would be appreciated that it was of essential importance to provide for the movement of a main in both directions, that was to say both in compression and tension, and this had been the reason that the Dresser coupling type of joint had been adopted.

In cases where drawn joints had been experienced—and there had been hundreds of these—it was the practice at Cannock to clamp on to leaking sockets an india-rubber sealing ring and then clamping this securely into position after first caulking back the lead about ½ in. from the face of the socket. A total of 539 Dresser clamps had been fitted on leaking sockets in the Cannock district during the past 16 months and so far there had been no case where another leak has been detected on any joint so treated.

Mr. C. R. Ingham, Engineer of the Cannock Company, who had devised these methods for use in the Cannock district would be glad to give any further information to anyone interested.

In the Tamworth district the method of bagging off and testing sections of mains with a small test meter had been adopted with exceptional success and had prevented leakage which would have amounted to several millions of cubic feet per annum.

In another area where the leakage was very high the system of installing a B.M. meter temporarily to measure all the gas passing into a certain section had been adopted. The quantity passing through the meter was then compared with the quantity registered in a definite time by all consumers in that particular section. This method had only recently been started and Mr. Gill added that at present he was unable to give actual results, but he expected the method to be very helpful in guiding the search for leakage.

He was impressed with Mr. Kenshole's remarks respecting the importance of employing and using intelligently a syphon book system as syphons could so often be a clear indication of main leakages. He noted with interest that at Merthyr Tydfil meter reading was carried out not only at quarterly, but also at half-quarterly, periods for checking purposes at which time the opportunity was taken of obtaining the necessary information for keeping the consumers' census cards up-to-date.

Mr. Rounds thought that the arrangement of fixed duties for workmen tended to kill initiative and was inclined to keep a man in a groove. Mr. Gill explained that what he had in mind in dealing with this matter in his Paper would have neither effect. The point he had tried to make was that if regular duties were to be carried out, some particular man should be deputed to do that work. As a result he became skilled in carrying out the job. He took an interest in doing it well as it was part of his definite responsibilities. It was also known to the management that if the job was not done properly there was only one man to blame. Mr. Gill believed that this method of delegating duties to individual men was one of essential importance in a well-run works, but he thought it possible that Mr. Rounds has misunderstood his references to that matter in the Paper.

He was glad to have Mr. Chester's comments, with which he thoroughly agreed. It was interesting to learn of some of the methods which had been the cause of the very great progress made at Swindon during recent years. The question of the characteristics of the soil in which pipes are buried to which Mr. Chester so usefully referred was a matter of greater importance than was generally realized. Recently, the American Gas Association had published some useful information on this subject. This, he thought, was worthy of publication in the Technical Press. Mr. Chester, as did Mr. Jackson, had referred to the useful practice of painting meters fixed in each year in different colours to simplify the changing of the meters after definite periods. He was glad to have this suggestion.

Mr. Robb seemed to have the impression that he was critical of the smaller undertakings, but Mr. Gill said he did not plead guilty to that and was rather at a loss to know to what particular points in the Paper Mr. Robb was referring. Mr. Gill added that he certainly had no intention of being more critical of the management of small than of large undertakings.

Vote of Thanks.

The President (Mr. J. H. Canning, O.B.E., J.P.) proposed a hearty vote of thanks to Mr. Gill for a most excellent Paper.

Mr. W. T. Kenshole (Merthyr) seconded and the vote was carried with acclamation.

Gas at Forthcoming Exhibition

The Bristol Municipal and West of England Industries Exhibition, which is being held in September next, and is one of the largest Exhibitions ever held outside London, will contain an excellent Gas Display, comprising over 65 stands.

Many firms are co-operating with the Bristol Gas Company, who have taken several blocks, comprising 48 stands for this purpose, and other firms in the Gas Industry who have taken individual stands include the following: Cannon Iron Foundries, Pentecon Cookers, Economic Gas Boilers, J. Stott & Sons, R. J. Hunt, Ltd., W. H. Dean & Sons, New Geysers, Ltd., A. H. Wilkes & Sons, Ltd., Ewart & Sons, Interoven Stove Company, and G. N. Haden & Sons.

This gas display will be seen by over half-a-million visitors from the five Counties of Gloucester, Somerset, Wilts, Devon, and Cornwall.

Coal and Coke Handling Plant at the Higginshaw Gas-Works, Oldham

by F. CARTLEDGE,
Oldham Corporation Gas Department.

From a Paper before the Manchester and District Junior Gas Association on May 6.

In the first part of his Paper Mr. Cartledge gave a description of the coal and coke handling plant installed at the Higginshaw Gas-Works, Oldham. He then went on to discuss costs.

Coal Handling Plant.

The labour on this plant consists of a platelayer, whose time averages 4 hr. per day; a coal machine man (8½ hr. per day); a coal conveyor man (8½ hr. per day); and a coal plant cleaner (4½ hr. per day).

Coke Handling Plant.

The labour on this plant consists of 3 coke conveyor men (one man per shift); and one coke plant cleaner (8½ hr. per day).

The average yearly maintenance, operation, and running costs of the coal and coke handling plant are given in Tables A and B respectively, taken over a three-year period ended March 31, 1938. The costs include all repair, maintenance, operation, and running charges over that period, allowance having been made for any extensive repairs to be proportioned accordingly.

It should be mentioned that the Gas Department generates all its own electricity, and the proportionate charges for attendance and maintenance of the generating plant have been included in the running costs.

It is interesting to note from Table A that the cost per ton of handling coal from the railway sidings to the coal storage bunkers in the retort house would be as follows:

	Pence per Ton.
Railway sidings	0·288
Steam locomotive	1·679
Weigher and wagon tippler	0·725
Coal receiving hopper and feeders	0·155
Coal conveyor "A"	0·195
Coal breaker house	0·037
Coal conveyor "C"	0·177
Lipped bucket conveyors	0·692
Coal chutes and bunkers	0·059
Total	4·057

The cost of handling coke from the retorts ready for loading into carts or bagging machines, including all screening, would be as follows:

	Pence per Ton.
Lipped bucket conveyors	1·204
"D" coke chute	0·299
Coke conveyor "D"	1·067
Grizzley screens	0·836
Coke conveyors "K" and "L"	0·063
Gyrex screens	1·723
Vibrex screens	2·503
Coke storage hopper and chutes	1·156
Total	8·851

It will be noted in the above figure allowance has not been

TABLE A.—*Coal Handling Plant.*

[Average Yearly Maintenance, Operation, and Running Costs over Three-Year Period Ended March 31, 1938.]

Description of Plant.	Maintenance Wages.	Materials.	Running Costs, Electricity, Oil, Coal, &c.	Tonnage Handled.	Operators' Wages.	Total Charges.	Cost per Ton. All Charges.
	£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.	d.
Railway sidings	55 8 2	6 13 3	2 0 0	63,700	18 9 4	82 10 9	0·288
Steam locomotive	118 6 1	30 10 7	101 10 0	68,700	233 7 7	420 14 3	1·679
Coal breaker house	2 1 0	0 10 0	0 10 0	63,280	21 14 9	24 15 9	0·087
Weigher and wagon tippler	31 11 4	50 19 9	21 5 0	63,700	103 17 5	207 13 6	0·725
Coal receiving hopper and feeders	6 8 3	5 0 0	2 10 0	68,700	30 8 11	44 7 2	0·155
Coal conveyor "A"	1 5 11	1 11 0	24 0 0	68,700	29 4 1	56 1 0	0·195
Coal conveyor "B"	1 13 9	1 10 0	10 0 0	10,000	11 2 10	32 6 7	0·583
Coal conveyor "C" and "Westminster" weigher	2 17 3	2 6 0	11 0 0	68,280	34 8 5	50 11 8	0·177
Coal chutes and bunkers	2 19 8	5 15 0	—	68,280	8 5 8	17 0 4	0·059
Coal crane	13 1 9	15 17 3	22 10 0	8,750	44 12 0	96 1 0	2·634
L.B. conveyors	41 12 2	12 15 0	19 10 0	63,280	123 12 0	197 9 2	0·692

TABLE B.—*Coke Handling Plant.*

[Average Yearly Maintenance, Operation, and Running Costs over Three-Year Period Ended March 31, 1938.]

Description of Plant.	Maintenance Wages.	Materials.	Running Costs, Electricity, Coal, Oil, &c.	Tonnage Handled.	Operators' Wages.	Total Charges.	Cost per Ton. All Charges.
	£ s. d.	£ s. d.	£ s. d.		£ s. d.	£ s. d.	d.
"D" coke chute	19 7 7	38 11 3	—	46,500	—	57 18 10	0·299
L.B. conveyors	62 18 9	18 0 0	29 5 0	46,500	123 4 3	233 8 0	1·204
Coke conveyor "D"	22 18 3	9 7 2	7 1 4	46,500	167 10 0	206 16 9	1·067
Coke conveyor "J"	5 13 5	2 17 0	3 4 6	3,800	16 2 0	27 16 11	1·758
Coke conveyor "H"	4 19 0	3 15 0	3 6 0	5,000	27 8 0	41 8 10	1·989
Coke conveyor "G"	5 3 2	2 16 0	5 6 3	11,000	68 12 0	81 17 5	1·786
Coke conveyors "L" and "K"	3 12 9	0 11 0	0 7 6	42,750	6 15 0	11 6 3	0·063
Coke conveyors "E" and "F"	5 8 7	4 10 0	3 10 2	16,000	86 16 0	100 4 9	1·503
Grizzley screens	29 3 5	20 11 7	5 5 6	50,300	120 7 0	175 7 6	0·836
Gyrex screens	86 17 7	38 4 0	7 14 6	42,750	174 5 0	307 1 1	1·723
Vibrex screens	23 11 7	31 10 4	3 8 9	10,500	51 0 0	109 10 8	2·503
Coke cutters	0 4 0	—	1 11 9	1,000	1 10 0	3 5 9	0·789
Skip loading hopper	0 5 6	0 10 6	0 10 0	5,000	23 5 0	25 1 0	1·202
Coke crane	21 10 3	6 2 6	19 16 10	9,000	94 10 0	151 19 7	4·052
Bagging machines	7 1 5	2 0 0	2 0 0	8,000	111 1 6	122 2 11	3·664
Coke storage bunker and chutes	61 7 5	41 15 6	0 10 0	50,300	138 15 8	242 8 7	1·156

made for the discharge of coke from the retorts by the bottom firemen. This figure works out at 1·288d. per ton.

General Observations on Plant.

When any plant, such as that installed at the Higginshaw Gas-Works in 1932, has been in operation over a number of years there are many features which have required some modification or adjustment to obtain the most economical results, and in a Paper such as this it will readily be appreciated that space and time will not permit all the problems to be dealt with, so that it is proposed to deal with those which I consider may prove useful.

Wagon Tippler and Weigher.

When this machine was installed, the supporting chock and sustaining timber beams on which the wagon rests when tipping were covered with hemp rope. Due to the weather and use, this hemp rope lost its resilience and became hard, with the result that the timber beams soon began to be splintered by the bolts on the wagon sides, and had to be renewed. The idea of using portions of discarded motor tyres to act as a rubber cushion was adopted, and has proved most effective and satisfactory.

The operating wire ropes are treated with rope dressing and their average life is approximately 13 months.

Coal Crane.

Two new winding ropes and one new jib rope have been required on this crane since it was installed, the crane during this period having handled approximately 43,000 tons of coal.

After the crane had been in use approximately three years, it was noticed that the slewing rollers were slowly biting into the enclosing rim. Brass washers were fitted behind the rollers, which appear to have quite solved the trouble.

Belt Conveyors.

The whole of the belt conveyors after nearly seven years' wear have proved most satisfactory, and although I consider that our specification of belts was somewhat stringent, I do maintain that it has proved its value and, generally speaking, cheap belts are a false economy. Up to the present "A" coal belt has handled 445,000 tons of coal, and "D" coke belt has handled 302,000 tons of coke.

All the original belts are still in use with the exception of "D" coke belt, of which we have renewed at different periods approximately 25% of its length in addition to vulcanizing rubber to short strips of the belt which have been damaged. This "D" coke conveyor belt it will be seen has the most arduous duties of any of our belt conveyors, as it handles the whole of the coke made on the vertical retort plant, and some of the coke is quite warm when being handled. This conveyor is lubricated throughout, once every three weeks, and this takes approximately 2½ hr. to complete.

The cleaning brush, which is of the revolving bristle type, fitted at the head end of the conveyor, at present only lasts about four weeks. This is mainly due to the fact that when new sections are added to the belt, correct tensioning of the cleaning brush cannot be obtained for the old and new sections, hence more rapid wear takes place now than with a new belt; a cleaning brush on a new belt will last approximately 10 to 12 weeks. It might be of interest to mention that we have tried both a rubber belt scraper built up similarly to the blades of a lawn mower and the rubber "Squeegee" belt cleaner, but up to the present, although the bristle-brush is more expensive, we have found no better method of efficiently cleaning the belt. The bristle brushes are, of course, easily re-bristled when necessary.

Chutes.

The whole of the chutes for handling coal and coke are constructed of ⅜ in. thick mild steel plates with, as far as possible, removable top covers; the coke chutes were originally lined with ½ in. thick hard cast-iron renewable liner plates.

The chutes on the coal handling plant have caused no concern whatever, and up to date no renewals have been found necessary.

The chutes for the handling of coke, however, come under quite a different category, because of the abrasive action of the material with a possibility of breakage of the coke. The renewal of the liner plates on these chutes was one of constant expenditure, and various experiments have been tried with different materials with a view to reducing the costs to a minimum, and also avoiding breakage of coke as far as possible.

The original liner plates in "D" coke chute (which handles the whole of the coke made in the vertical retort plant) had an average life of 15 months, or approximately 30,000 tons of coke; these were replaced with a special "Hardwear" cast iron and a trial with two plates in ordinary grey cast iron. The ordinary grey cast iron wore out in 9 months and the special "Hardwear" cast iron in 18 months. With a view to obtaining further improvements, prices and particulars were obtained in June, 1936, from four leading manufacturers for plates which they considered were the most suitable for the job, as follows:

—	Price per Cwt. s.	d.	Composition.	
1. Hardwear metal ..	24	6	Not stated	
2. Izamite metal.. ..	37	6	Carbon	3·3 %
			Silicon	0·8 „
			Manganese	0·8 „
			Nickel..	4·5 „
			Chromium	1·5 „
3. Ni-Hard metal ..	43	6	Carbon	2·8 „
			Silicon	0·75 „
			Nickel	4·5 „
			Chromium	1·5 „
			Brinell hardness ..	550/650
4. Chromonard metal ..	61	0	Carbon	2·5 %
			Chromium	0·4 „
			Brinell hardness ..	350

Rubber lining could not be recommended due to the moisture content and temperature of the coke at this point.

These sample plates were fitted in the chute on Oct. 17, 1936, in a position where an equal wear on all plates was anticipated. On May 16, 1938, these plates were taken out and it was noted that the "Hardwear" metal plate was worn through. A close estimate of the life of the plates was as follows:

Hardwear metal plate	18 months
Izamite „ „	2½ years
Ni-hard „ „	3–3½ years
Cromonard „ „	2–2½ years

"Ni-Hard" metal was thus considered to be the best and most economical metal to meet our requirements. In the interim, however, the price of this metal had increased from 43s. 6d. per cwt. to 63s. per cwt., making a total cost of £77 to line this particular chute.

During this time we were experimenting with the lining of coke chutes with rubber and blue tiles.

When the chutes were installed, they were designed to give a steady flow of the material handled, and it was found that rubber very definitely retarded the flow of coke, and in our own particular case was not the success we anticipated, although we have installed rubber covers for the flopper plates and rubber baffles in the chutes where the travel of coke changes direction, with very beneficial results for overcoming breakage.

With blue tiles for the lining of coke chutes, one only meets with partial success because of their inconsistency of hardness, and whereas some of the tiles will last for a considerable time, others of the same consignment wear very rapidly. With this in mind, we made several enquiries about tiles and we finally adopted for "D" coke chute, tiles made from cast basalt. This substance is a natural volcanic deposit and is prepared by melting the actual rock in a furnace at very high temperatures. The resulting liquid is then moulded into tiles, and afterwards annealed to take out internal stresses. The tiles in "D" coke chute are 1 in. thick and were installed in June, 1938, and up to the present time very little wear has taken place. We have also just lined two further coke chutes with similar tiles and we fully anticipate that a minimum working life of 5 years will be obtained.

Screens.

As I have already stated, we have three types of coke screens. Two grizzley screens for scalping all coke over 2½ in.; two double deck Gyrex screens for 2½ in. to 1½ in. and 1½ in. to ¾ in.; and two single deck Vibrex screens for ¾ in. to ⅜ in.

These screens have proved most efficient in working, and

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from the cost per ton for maintenance and materials, including oil and electricity—viz.:

Grizzley screens	0·262 pence
Gyrex screens	0·745 pence
Vibrex screens	1·338 pence

I consider their performance very satisfactory.

On the grizzley screens we have had the discs manufactured in specially hard cast iron, and these have a life of approximately three years, or 70,000 tons of coke.

With the gyrex screens, we have had the mat made into three sections; the top section always gets the most wear, and when this has worn almost through at the top centre, it is taken out and a new one substituted. This mat is then repaired by welding a portion in and later replaced in the second section, the second section being placed at the bottom. In this manner we can obtain six months' wear from each mat.

With regard to the type of mat for this screen, we have now adopted the straight wire spot welded type in preference to the woven wire type, as we found a tendency for the woven type to open out with wear, due to the tension which has to be maintained. Another factor in favour of the spot welded type is the ease with which new portions can be welded in.

The 1½ in. mesh mat is made from $\frac{5}{16}$ in. thick wire, and the ¾ in. mesh mat from 5^{s} gauge wire (S.W.G.).

The vibrex screen mat being much smaller in size than the gyrex, we have retained this in one section. These mats are ⅜ in. mesh made from 9^{s} gauge wire (S.W.G.) and last approximately five months. The wear is always at the top, and after the mat has been in operation three months it is turned round and a further two months' life is obtained.

A woven wire mat is used on this screen, as the additional cost of straight spot welded wire mats outweighs any advantages that may be obtained. Deflectors have been fitted to the sides of the screen to guide the coke to the centre, thereby obtaining a more equal wear across the face of the screen mat and effecting more efficient screening by preventin breeze creeping down the edges.

De-breezing Screens.—In all the delivery chutes to the railway wagons, road vehicles, and bagging machines, we have static de-breezing screens which are ⅜ in. mesh and 8^{s} gauge wire (S.W.G.). These are emptied periodically by the coke bagging men, and we obtain approximately 38 lb. of breeze per ton of coke handled.

Lipped Bucket Conveyors.

The two lipped bucket conveyors, which completely encircle the retort bench, are of a capacity of 100 tons of broken coal per hour, designed to handle simultaneously both coal and coke. Provision has been made to permit either conveyor to do the whole of the work, while the other can act as a stand-by if desired. Each conveyor is 348 ft. 6 in. long, driven by a 25 h.p. motor through a chain drive and double helical reduction gear at a final speed of 48 ft. per minute.

These conveyors, as will be noted from the layout, are a very important unit in our coal and coke handling plant, and considerable attention has been given to them to have reached the present standard of efficiency. The original conveyor chains which were installed with the plant were of the "D" type, fitted with drip feed lubrication, manufactured by Messrs. Babcock & Wilcox, Ltd.

This type of lubrication, with which, no doubt, many of you are acquainted, allowed oil to drip on to the links when the conveyor chains were passing a given spot. This method of lubrication, which was then common practice, proved very unsatisfactory, as the oil adhered to the wheels and links, and got covered with coke dust when coke discharging took place. This formed a very good grinding paste and also prevented lubricant finding its way to the bushes and rollers, consequently rapid wear took place and renewals were frequent.

After the chains had been at work 14 months (by March, 1934) the wear on the chains was so substantial that, as a result of discussions which had taken place during this period, it was decided to convert the existing chains to the internally lubricated type, to work in conjunction with automatic oil lubricators.

A complete outfit of new axles, bucket studs, bushes, and rollers was obtained together with a number of new side links, but owing to the limited clearances of the conveyor structure it would not permit the standard axles and bucket studs with the extended grease nipples being incorporated in the reconstructed chains, and consequently, it was decided to countersink the nipples in the bucket studs and axles.

A close observation of the working of the chains was continued, and various types of automatic oil guns were tried out but without success, this being due to (1) the inequalities of the conveyor chains, and (2) the countersunk portion at the end of the axles and bucket studs becoming clogged up with oil and dust, and thereby preventing the gun nozzle from engaging the grease nipple.

In 1935 the whole question was again under review with the manufacturers, when we agreed to carry out the necessary alterations to the conveyor steelwork to allow sufficient clearance for the standard automatically lubricated chain, and the manufacturers agreed to replace the existing chains with two entirely new standard "S" type chains.

On examination of the new "S" type chains, we were of the opinion that the working clearances and consistency of hardness could be improved and permission was granted to have a special 40 ft. length of similar chain manufactured under licence by a Birmingham firm to our specified working clearances and with a consistent case hardening.

A comparable table of the working clearances of the two chains was as follows:

—	Standard Chain.	Special 40 Ft. Length.
Bushes—		
Internal diameter	1·135–1·143	1·127–1·130
Outside diameter	1·502–1·510	1·498–1·502
Bucket studs and axles	1·122–1·125	1·123–1·125
Link holes—		
Small diameter	1·125–1·131	1·125–1·127
Large diameter	1·511–1·514	1·500–1·502
Runner wheels	1·516–1·521	1·505–1·508

The question of oil *versus* grease for lubrication was also discussed, and as automatic oilers had been ordered for one chain, it was decided to lubricate one chain with oil by the automatic oilers and the other chain by grease from a hand-operated grease gun.

The two chains were installed and set to work in January, 1936. The conveyor chain on the waste heat boiler side (No. 1 chain) being lubricated with oil, and the conveyor chain on the producer side (No. 2 chain) with the special 40 ft. length being lubricated with grease.

These chains are gauged for wear every three weeks, and a comparable table on the wear of six axles of the two respective standard chains, together with three axles of the special section, are given in Table C.

Up to January, 1939, 28 axles, 1 outside link, 1 inside link, and 1 bush have been renewed in No. 1 conveyor; and 2 axles in No. 2 conveyor; very little wear has been experienced in the special section of chain, there being less wear in this section than on any portion of chain in the two conveyors.

From our experience, it definitely points out that for conveyors handling coke, grease lubrication is preferable to oil, as the grease, with internal lubrication, has a greater tendency to expel the grit and form a seal between the links.

We have tried to convert our automatic oil lubricators to grease, but up to the present have been unsuccessful, as the difficulty is in getting the grease down the flexible tube from the container to the gun nozzle.

When the new conveyor chains were installed, all the buckets were turned round because of wear on the lips caused by the overturning wheels at the end of the top conveyor track. Some time after the plant was put to work we covered the periphery of these wheels with specially designed rubber tyres which eliminate the wear as much as possible.

Another interesting feature we have incorporated in the conveyors is the electrical safety device for stopping the conveyors, should the buckets fail to right themselves after discharging coke ready for receiving coal. Before installing this safety device, several stoppages occurred due to foreign matter such as a piece of carbon from the retorts getting lodged in the coke chute and the coke consequently building

TABLE C.—*Test on Conveyor Axles.*

No. 1 Chain (Oil Lubricated).

Wear in Thousandths of an Inch.

	Waste Heat Boiler Side.				Producer Side.			
	Nov., 1936.	Nov., 1937.	Jan., 1939.	Total.	Nov., 1936.	Nov., 1937.	Jan., 1939.	Total.
Axle No. 1 ..	8	10	16	8	15	20	22	7
Axle No. 2 ..	10	16	18	8	20	29	34	14
Axle No. 3 ..	0	12	17	17	15	25	26	11
Axle No. 4 ..	15	19	25	10	0	8	12	12
Axle No. 5 ..	0	6	12	12	25	33	38	13
Axle No. 6 ..	0	6	12	12	0	8	12	12
Total for 6 axles ..				67	Total for 6 axles ..			69
Average per axle ..				11·16	Average per axle ..			11·5

No. 2 Chain (Grease Lubricated).

Wear in Thousandths of an Inch.

	Waste Heat Boiler Side.				Producer Side.			
	Nov., 1936.	Nov., 1937.	Jan., 1939.	Total.	Nov., 1936.	Nov., 1937.	Jan., 1939.	Total.
Axle No. 1 ..	4	8	10	6	27	36	38	11
Axle No. 2 ..	22	25	26	4	16	23	24	8
Axle No. 3 ..	18	23	27	9	16	20	20	4
Axle No. 4 ..	15	20	23	8	8	10	16	8
Axle No. 5 ..	6	12	13	7	6	8	14	8
Axle No. 6 ..	8	15	20	12	16	21	26	10
Total for 6 axles				46	Total for 6 axles ..			49
Average per axle ..				7·66	Average per axle ..			8·16

Special 40 Ft. Length (Grease Lubricated).

Wear in Thousandths of an Inch.

	Waste Heat Boiler Side.				Producer Side.			
	Nov., 1936.	Nov., 1937.	Jan., 1939.	Total.	Nov., 1936.	Nov., 1937.	Jan., 1939.	Total.
Axle No. 1 ..	16	22	26	10	8	10	12	4
Axle No. 2 ..	0	0	0	0	12	13	14	2
Axle No. 3 ..	10	14	16	6	10	18	19	9
Total for 3 axles ..				16	Total for 3 axles ..			15
Average per axle ..				5·33	Average per axle ..			5

up and not allowing the buckets to right themselves, the buckets thus catching the guide angles. Should this happen now, the top of the bucket strikes a small lever which breaks the electrical circuit and stops the conveyor before any damage is done.

Discussion.

The **President** (Mr. Platt), in opening the discussion, said that many would be comparing the costs on their own works with the figures given in the Paper, and he would like to give a word of warning. Because costs were lower than given in the Paper, it did not necessarily follow that better value was being obtained. Similar costs and similar work must be compared to obtain a true perspective. He agreed with the conclusion given in the Paper that ordinary single wire mesh, spot welded, gave better screening and had a longer life than woven type screens.

Mr. D. Benson (Bolton) referred to the welding of mesh screens as they became worn, as outlined in the Paper. What welding apparatus was used?

The **Author** replied that the worn portions of the screens were cut out by oxy-acetylene, and the required portion welded in. Portions of discarded meshes were often quite good, and from these the required part could be cut, and welded into position.

Mr. J. Allbinson (Manchester) stated that the present intensive study of physical and chemical aspects of gas making made it particularly appropriate that a Paper should be read which dealt with research work in connexion with mechanical engineering. It was essential that an attempt should be made to preserve a balance of all the many branches comprised in the Gas Industry. He would like to know if the cost for the locomotive for coal handling was a net cost, or was it a gross cost, against which there would be a "set off" for handling tar, liquor, and other materials.

It was also noticeable from the tables that coal conveyor "A" was handling approximately the same weight of coal as conveyor "C," but conveyor "C" was lifting the coal about twice as high, and approximately double the distance, yet the cost of handling per ton by this conveyor was lower. The cost given for conveyor "A" for the coal from the coal wagon to the distributing house was 0·195d. per ton for a relatively short run, while the cost of taking the coal to the top of the retort house was only 0·177d. It was reasonable to assume that the further and higher the coal had to be conveyed, the greater would be the cost incurred.

The Author appeared to confirm the general opinion that coke was more difficult to handle than coal, though it appeared to be difficult to give expression to it as a definite quantitative figure. If two identical conveyors were working on coal and coke respectively, the cost would be 60% greater for coke.

What was the actual size of the basalt tiles, and what kind of cement had been used for fastening them in? Had any experimental work been carried out with the object of lengthening the life of the belts by using a preservative mixture—*e.g.*, using a mixture of breeze and tar as a coating on the surface of the belt? Stockholm tar and breeze had been used in this connexion.

Mr. Cartledge replied that two-thirds of the total locomotive costs were charged against coal handling, the balance being charged against coke, tar, and liquor traffic. It was true that "A" conveyor belt was shorter, but it was 30 in. in width, had a high variable speed, and required a 30 h.p. motor, which resulted in increased cost. The difference in running costs between the two conveyors was very small.

The cast basalt was manufactured by a specialist firm, and kerolith putty was used to secure the tiles.

The treating of conveyor belts with dope was controversial. The belts had already conveyed half-a-million tons of coal, and were in such an excellent condition that it was anticipated that they would be capable of dealing with double that quantity. The conveying of the coke from the retort house was another question. Vulcanized short strips had been tried, but the belts had not been treated with dope, and the Author did not think it would be successful. Every endeavour was made to keep the belts clean, and quite a considerable sum had been spent on the purchase of bristle brushes for that purpose.

Mr. H. N. Dann (Blackburn) referred to the pleasure the visit had given him personally, since he remembered the plant before the reconstruction took place. It appeared to him that the adoption of belt conveyors at the time of the reconstruction was a bold move, but the results obtained had fully justified that form of conveyance. To-day, in all probability, everyone would adopt belt conveyors, because of the freedom from noise and dust, together with the low running costs. He was also pleased to note that Oldham kept their costs in such detail. In his opinion, it was always a good omen to find that an undertaking was prepared to carry out its costing in such detail. As far as his experience went, the Gas Industry would be well advised to carry out some of the suggestions put forward by the Author, and to undertake mechanical inspections to a much greater degree. The results should be tabulated and made available for future reference.

The **President** stated that in the Paper reference had been made to chains, &c., and he enquired what steps Oldham were taking in regard to carrying out the requirements of the Factories Act.

The **Author** replied that the conditions of the Act had to be complied with, and all the regulations were being observed. All the lifting tackle, &c., was itemized, and tested in accordance with the Act.

Mr. E. B. Field (Blackburn) referred to a statement in the Paper that "all the pulleys on the coke handling plant which came into contact with the top surface of the belt were covered with $\frac{3}{16}$ in. rubber, to resist the abrasive action of the coke remaining on the belt." How was the rubber attached? Was there any objection to lining the chutes with concrete, which, in his opinion, fulfilled the requirements quite well?

The **Author** replied that the pulleys were bought with the rubber covering vulcanized on. The rubber was not fitted on at the works; the pulleys were sent away if it was necessary for them to be re-vulcanized. It was well nigh impossible to line some chutes with concrete, and this was the case at Higginshaw. In his opinion, concrete did not resist the abrasive action of coke to the same extent as tiles, and he had known of cases where the reinforcement had been exposed. The conditions obtaining with coke were too severe owing to the stresses set up by hot and cold

coke. Unless concrete could be kept under close observation in an open chute, he would not like to adopt it.

Before the sloping portions of the chutes at Higginshaw were finished, Salferricite was trowelled in. This was a substance similar to fine carborundum dust, and the results obtained had been very good.

Mr. W. Hodkinson (United Kingdom Gas Corporation) in proposing a vote of thanks to the Author, said that the subject-matter of the Paper was of major importance. As a general rule, coal and coke handling plants were left in charge of a labourer. The Paper was of definite advantage to all concerned with coke and coal handling plants.

Mr. Burnett (Blackpool) seconded the vote of thanks. He said that all the Blackpool members had been particularly interested, in view of the new installation which was being erected in the town they represented. In the Paper it was stated that approximately 60% of the coke handling costs were due to the screening plant. Did the market justify these extra costs? In other words, if Oldham had to erect a new coke plant, would they arrange to screen to so many sizes? Had Oldham considered the question of lining the chutes with glass? He had heard of two works where plate glass had been used with good results. He would also like the Author to give some further information in regard to the buckets on the L.B. conveyor. What metal was used?

Mr. Cartledge thanked the members for their vote of thanks, which he much appreciated. When the Higginshaw plant was reconstructed, it was definitely decided to provide suitable grades of coke for all consumers, and in this respect they had been extremely successful. There was no preponderance of any particular grade left in stock. He was of the opinion that if a plant had to be designed to-day, Oldham would not depart from the present grades of coke. If an undertaking could supply any grade, it should help it to dispose of its coke more easily.

The lining of chutes with glass had been considered, but the amount they could pay for any material depended upon its useful life.

The lip bucket conveyors were made of pressed mild steel, and the cams were made of malleable iron. It had been necessary to renew about 12 buckets since they were installed. When showing signs of wear the buckets were turned round.

He would like to mention, in closing, the dust extraction plant. It had not been installed for the extraction of dust from the coke, but for the benefit of the operatives. A test had been made recently, and it was found that 166 lb. of dust was extracted each day. Had the plant not been in operation, this quantity of dust would have been scattered all over the works, and it was a point worthy of consideration.

Wales and Monmouthshire Juniors

Annual General Meeting

The Annual General Meeting of the Wales and Monmouthshire Junior Gas Association was held at Swansea on April 22. Members assembled at High Street Station and were then conveyed to the Langland Bay Hotel on the Gower Coast, where they were welcomed by Mr. F. STUART JOHNS (President of the Association).

The President also welcomed Mr. B. Carson, of Ascot Water Heaters, Ltd., who read a Paper which Mr. Leopold Friedman was to have given, but owing to unforeseen circumstances was prevented from doing.

The following officers were elected for Session 1939-40:

President.—R. T. Mills (Cardiff).
Senior Vice-President.—D. W. Rees (Neath).
Junior Vice-President.—W. R. Branson (Cardiff).
Hon. Secretary.—K. M. Ernest (Cardiff).
Hon. Treasurer.—B. J. Bell (Cardiff).
Hon. Librarian.—H. S. Bartlett (Cardiff).
Hon. Auditors.—T. Noall (Cardiff) and F. Robertson (Cardiff).

Only two nominations having been received for the two vacancies on the Council, Messrs. K. H. H. Langford (Cardiff) and F. Robertson (Cardiff) were elected.

YORKSHIRE JUNIOR GAS ASSOCIATION

Short Paper Meeting

On May 13 the Yorkshire Junior Gas Association held a Meeting at Harrogate, when three short Papers were read. Extracts from these are given below.

DISTRIBUTION FOR AN INDUSTRIAL LOAD

By D. C. GUNN, Yorkshire Industrial Gas Development Centre

Recent increases in the industrial loads of gas undertakings have caused certain problems in the distribution system which, if not carefully considered and adjusted, will deter the use of gas as an industrial fuel rather than advance it.

Consider an undertaking where the distribution system was laid down to meet an almost entirely domestic demand. The consumption calls for large quantities of gas at definite periods during the day between intervals of comparative quiescence. The maintenance of low or normal pressure with increases corresponding to the peak loads was considered to be adequate, the magnitude of the increases being derived from consideration of data from previous years.

To-day the same undertaking may be supplying some 30% of its total gas sales to industry, resulting in a considerable change in the times and magnitude of maximum and minimum gas flow. This will cause a necessary variation of the gas pressure chart at the station governors in order that suitable gas pressures may be maintained in the various parts of the district.

Industrial loads, however, cannot be associated generally with the fairly regular peaks and troughs of domestic demand. The amount of variation in consumption and its time of occurrence will be peculiar to every undertaking due to the class of industry served and the layout of the distribution system.

Many undertakings have not the opportunity of obtaining large process loads, but supply considerable quantities of gas for central heating. This load will give seasonal fluctuations almost parallel with those produced by the domestic load and will tend to accentuate their magnitude. On the other hand, examined over a shorter period of, say, one week, the peaks of the domestic load will tend to be smoothed out by the central heating consumption. Central heating installations generally are arranged by clock control to start work early in the morning—for instance, at 5 a.m. In normal weather they will continue to work fully until the buildings attain normal temperature, and then the thermostats will commence operating, so that by the time the lunch hour demand is starting the boilers are beginning to cut out. This assumed state of affairs could be made a fact by the adoption of dual clock control, shutting off the supply, for example, from noon until 1.30 p.m. The majority of central heating installations would be shut off over week-ends, thus easing a prominent Sunday peak.

It must be remembered that most of the thermostats and pressurestats used on boiler plant are of the "all off, all on" type with a small by-pass consumption of up to 10% of the maximum gas consumption, so that on occasions when these instruments operate sudden fluctuations will occur in the gas flow. In these days, when boiler plant consuming some 20,000 cu.ft. of gas per hour is being installed, the effect of these fluctuations on the pressure conditions in the district concerned demand attention. A 10,000 cu.ft. an hour sudden change of load on the end of a quarter of a mile of 10 in. main will cause a fluctuation in pressure of 6 tenths in. W.G., it being assumed that the flow changes from 20,000 to 30,000 cu.ft. an hour.

The industrial process load, however, is rather different, and can be split up into several categories. Take first of all furnaces which work continuously; large heat treatment, reheating, ceramic, and similar furnaces which work for 24 hours a day. Pressures must be maintained to meet a maximum demand as the shutting down or starting up of such furnaces may cause serious alterations in other parts of the district, and it would be of value if previous knowledge of an operation of this kind could be obtained so that adequate warning could be given to the governor house staff. The bank holiday periods should not be overlooked in this important connexion.

Where large changes in flow are likely to occur at unstated intervals, the automatically loaded station governor would appear to offer great assistance in maintaining adequate district pressure.

In certain parts of the country tunnel kilns for ceramic ware form a major part of the industrial load, and these offer individually a continuous consumption of anything from 1,000 to 10,000 cu.ft. per hour and are shut down only at bank holidays or for repair.

Large and small furnaces often use gas supplied at high pressure from a compressor on the consumers' premises drawing gas from the town mains. Air blast burners, in which air at high velocity is used to inspirate gas reduced to atmospheric pressure *via* a suitable governor, are very popular. In either of these cases, should the gas supply be inadequate, a negative pressure will occur in it causing, to say the least, great inconvenience to the factory and possibly to neighbours also. If there is any possibility whatever of the temporary inadequacy of the supply, an anti-suction valve should be fitted.

In the case of air blast burners the possibility of a reversal of flow in the gas main must not be ignored. This can be caused by stoppage of the nozzle and its effect counteracted by the fitting of a back-pressure valve on the appliance. It is the practice of many undertakings to insist on the installation of a back-pressure valve on all air blast installations.

The automatic temperature controls fitted to high temperature furnaces are not generally of the same type as those fitted to central heating and boiler installations. While the latter have a shut-down to, say, 10%, the shut-down on furnaces, especially continuous furnaces, may be only to 80%, as it is essential to avoid large fluctuations in temperature and atmosphere constitution. The fluctuations in flow are not then of such magnitude as those noted in connexion with central heating boilers, and therefore district considerations do not assume so much importance. It is, however, worth while examining the pressure fluctuations brought about on the premises of a consumer due to the operation of automatic controls.

Consider a pair of identical furnaces connected to the end of a 4-in. supply 250 yards long. The supply end of this pipe is connected to a 6,000 cu.ft. per hour high capacity meter fed from a 6 in. service. Regard the consumption of each furnace as being 2,000 cu.ft. per hour maximum and 1,600 cu.ft. per hour minimum on a two-position motorized valve. The over-all pressure drop from meter outlet to furnace inlet would be 11-tenths with each furnace fully on. With both furnaces off, the drop would only be 7-tenths, a change in pressure of 4-tenths. If one furnace should cut out, leaving the other furnace fully on, the latter would be subjected to a rise in pressure of 2·1-tenths, causing a sufficient increase in gas rate to bring the furnace temperature up and the control would cut off.

Thus the controls will interact one with the other, the operation of one being caused by the operation of the other and not by a change of conditions in the furnace itself, which, of course, should not be the case. It is therefore of the utmost importance that a separate governor should be fitted to each furnace, thus ensuring an invariable pressure there.

Apart from pressure changes brought about by the use of

automatic controls, the example just mentioned illustrates another important point—namely, the pressure necessary at the meter to give satisfactory operation of the furnace.

In order to maintain the furnace temperature, a definite rate of liberation of heat is required within the furnace. This means that the burners will have to pass a corresponding flow of gas. The discharge of gas through the burner port depends upon the area and shape of that port, the specific gravity of the gas or mixture, and the relative pressures behind and in front of the orifice.

It will at once be seen that a given discharge can be obtained by using a small differential and large orifice, or a small orifice and large differential. In the first case the discharge will be at low velocity, and in the second at high velocity. The furnace designer requires certain flame characteristics, perhaps a soapy luminous flame, perhaps a hard bunsen flame, or again a fully aerated flame. The method of obtaining the first is to allow a slowly moving stream of gas to diffuse into a slowly moving stream of air, so that the gas velocity through the burner port will be quite low. A hard bunsen flame demands a high velocity of gas through a small orifice in order that sufficient air can be entrained at the mixing chamber. The last case demands either an extremely high velocity of gas through a small orifice, or, alternatively, a low velocity of gas inspirated into high velocity air.

The story of flame characteristics is a long one, and I will not go more fully into it beyond drawing the conclusion from the above facts that the suitability of the flame for a certain job is dependent, among other factors, upon the pressure in the rail behind the burner. When the furnace builder states that he wants a certain pressure of gas at his furnace we must do our best to provide it, and not just say that with a lower pressure he can get the same discharge by opening up his orifices a little. If we do this there will be a possibility of our causing an alteration in flame characteristics, making it less suitable for the job in hand.

To return to the question of necessary pressure at the meter, consider the above installation. To recapitulate, it consists of a pair of identical continuous furnaces at the end of a 4 in. diameter supply. Each furnace is fitted with automatic control and a governor, and the supply is connected to 6,000 cu.ft. per hour high capacity meter at the works boundary.

The following figures would be approximately correct, showing the pressures required at various points in the supply:—

Furnace chamber	Atmospheric pressure
Inlet to burner	15 tenths w.g.
Manifold inlet	20 " "
Automatic control inlet	25 " "
Governor inlet	30 " "
Outlet of meter	41 " "
Inlet to meter	44 " "

A fall in pressure therefore below 44-tenths might embarrass the furnace user by causing a temperature drop in the furnace, thus interfering with the output. It is true that the burner dimensions could be altered to require a little less than 15-tenths, but there is a limit to which this can be carried. It is also true that a 6 in. supply could have been run, but what about the extra cost? Why should the consumer have to stand that? Surely if gas is to give the service that we state it does, it behoves us to see that the consumer gets a satisfactory supply with a minimum outlay, and, in the case outlined above, this would mean the maintenance at meter inlet of not less than 44-tenths pressure.

Gas is more than a first grade fuel; it is, or should be according to our own words, a service. Gas is not the only fuel nor is it the only service, but it has the opportunity of proving itself to be the best fuel and service. An intermittent furnace may take two hours to reach working temperature with a supply at 2·5-tenths pressure. If the pressure be increased to 3·5-tenths, then the same furnace may attain working temperature in an hour and a half. Half-an-hour's extra service for the consumer, will he be grateful or otherwise? In some cases, due to inadequate pressure, the consumer has come to regard a gas furnace as something sluggish and liable to drop in temperature at lunch hour and at other less explicable moments. An oil fired or electric furnace may be demonstrated to him—and exit one industrial consumer. Little does he know that, given a healthy supply, his gas furnace could outstrip its competitors.

TESTING OF SILICA REFRACTORIES

By J. W. STACEY, Assistant Fuel Technologist of the Sheffield and District Gas Company.

Having dealt with the general properties of silica materials and the tests for after contraction or expansion and the refractoriness safety test prescribed in the 1934 Specification of The Institution of Gas Engineers, Mr. Stacey went on to discuss refractoriness under load.

It is well known that the effect of mechanical load on refractories reduces their fusing temperatures. A brick having a refractoriness of 1,650° C. has been found to commence to deform as low as 1,350° C. under a pressure of 25 lb. per sq.in. Hence the testing of refractories under load shows the expected behaviour of a brick far better. This test is not including in the Institution Specification, and the remarks of the Committee throw some light on the reasons for this. This is what they say: "During the preparation of this revised Specification fullest consideration was given to the question of including a specified test for the determination of refractoriness under load characteristics of refractory materials, but it was eventually decided that further research on the test was required before a particular procedure could be laid down." This course was followed because there are such wide variations in the different methods and procedures employed, although it was recognized that the test yields information of great value and is widely used. During recent years much research has been concentrated on this subject, and it seems probable that at a later date the test will be included.

Testing for Refractoriness under Load.

Test pieces are prepared of a size 3½ in. × 2 in. × 2 in., cut from the brick or block. The edges must be parallel so that the pressure, when applied, acts in a true vertical direction and does not tend to thrust sideways. The furnace used has a silimanite lining and the test piece is supported vertically between two carborundum pressure blocks. Pressure is applied vertically by a system of levers and weights, and the temperature of the furnace is increased at the rate of 50° C. per 5 min. Provision is made for a graph record of the test so that as the temperature increases under the uniform load at which the test is carried out, the expansion of the test piece is first recorded and later the deformation of the test piece from the point at which softening commences to the point of failure.

The test piece on heating first expands in the normal way until the point where deformation commences is reached. Then the sample commences to yield and an increasing contraction takes place until the contraction becomes very rapid. The softening temperature is noted and also the temperature of complete failure. The actual temperature of failure is usually regarded as the temperature at which the test piece shows a reduction of 10% in length.

For a good silica specimen, the sample shows little yield or contraction until the temperature of collapse is nearly reached —whereas in the case of inferior test pieces a small but progressive contraction is noted at a comparative low temperature, such contraction continuing until the sample fails.

With regard to the load on the test piece, this remains constant throughout the test, and various opinions have been expressed as to what should be the magnitude. The most useful value would probably be the maximum load to which the brick would be subjected under normal working conditions when working in a setting of retorts. This has been assessed by American and Continental workers as 25 lb. to 30 lb./sq.in. The German Industrial Specification uses a value of 2 kg./sq.cm. (28·4 lb./sq.in.) and a test piece of size 50 mm. × 50 mm., of cylindrical section. On the other hand, in America, where probably the earliest experiments on the load bearing characteristics of refractories were carried out, a full sized brick is used, being subject to a pressure of 25 lb./sq.in. It is claimed that the use of whole bricks will be more representative of the whole batch than if small sections only are taken. Against this must be taken into account whether it is possible to avoid an appreciable temperature gradient within the brick, whilst maintaining a rate of heating which will allow tests to be completed in a reasonable time.

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English practice, as recommended by The Institution of Gas Engineers, is to use a load of 50 lb./sq.in.

There is no doubt that this test has complications, and results are influenced by certain factors independent of the material being tested. For example, Widemann's experiment showed that different rates of heating produced different temperatures of standard deformation. His figures for a silica brick and a firebrick using test pieces 20·5 mm. × 15·5 mm. × 14·5 mm. are as follows:

Rate of Temperature Rise.	Standard Deformation, ° C.	
	(1)	(2)
1,000° C. in 15 minutes ..	1,620	1,340
" " 30 " ..	1,650	1,370
" " 60 " ..	1,630	1,410
" " 120 " ..	1,640	1,420
" " 240 " ..	1,625	—

Column (1) refers to silica and column (2) to firebrick, the effect being more marked in the latter case.

The furnace atmosphere also has a bearing on the results. Reducing conditions are conductive to a lower refractoriness, since in this atmosphere the iron compounds are reduced from the ferric to ferrous, in which state they tend to produce more fusible compounds.

Other inherent difficulties in carrying out the test are the location of the test pieces in the furnace in order to give absolutely uniform heating, and the effect of the expansion of the thrust blocks. Thus it is obvious that it is necessary to standardize the procedure before the test can be specified.

Up to this stage an attempt has been made to show the general characteristics required in a brick in order to obtain satisfactory working, but one must also consider the conditions met with in actual practice, and review some of the main causes of corrosion or failure. Care in heating up and putting down settings cannot be over emphasized. In this connexion it has been pointed out that in coke oven installations the amount of wear and tear is not nearly so large as in gas-works settings, the former plant usually working for longer periods continuously.

Sources of Corrosion of Refractory Materials.

The state of the cleanliness of the carbonizing material has a bearing on the life of retort structures. Of course, for other considerations, gas engineers usually use washed coal, and the cleaning process helps considerably in that it removes iron compounds such as pyrites and leaves only the inherent ash. Iron compounds are undoubtedly enemies of refractory materials, and the corrosion once started is not only local, as the ferrous silicate has a progressive solvent action. Clean coal, furthermore, means clean coke for the producers and a lessening of clinkering troubles. Another point that has been put forward is that producer design should be such as to give a slow rate of travel of producer gas, again in order to minimize the carrying over of the iron containing flue dust.

Under this heading may be mentioned the deleterious effect of alkali vapours such as may arise from the sodium chloride in the coal carbonized. An interesting case which was put down to sodium chloride attack was investigated by F. H. Clews and other workers and reported by the Refractories Materials Joint Committee in 1938. This concerned a bench of vertical retorts. These workers found "considerable effects attributable to the salt content of the coal." The coal had contained as much as 0·66% of sodium chloride, but was used for the latter half of the observed period with equal parts of coal containing 0·1% NaCl. In this case the ill effects were chiefly on the flue side of the retort wall, and two different effects were noticed.

(1) The top silica work at the combustion zone level showed considerable erosion on the flue side.

(2) At the lowest end of the retort and at the zone of lowest temperature considerable expansion of the brick work had occurred, in places as much as 20% to 30%.

The latter had caused a certain amount of disintegration of the brickwork on the flue side.

Other sources of attack which have been investigated in recent years are the effects of methane and carbon monoxide. Conclusions deduced from experiments, which have chiefly been conducted only on a laboratory scale, are that certain firebricks are attacked by methane, while silica is much more resistant. The "iron spots" in the bricks appear to be the centre of corrosion: the reaction being a breaking up of the methane to carbon and hydrogen, the carbon being deposited and its accumulation causing fracture of the specimens. Similar experiments using town gas do not, however, cause disintegration of the specimens in any degree comparable with the tests using the pure hydrocarbon gases. Thus, although work is still being done on the subject, the attack on refractories by hydrocarbons as it may occur under working conditions does not appear to be a major difficulty.

Finally a word about jointing cements. While there is nothing definite in the I.G.E. Specification except that "it shall be quite suitable for use with the bricks, blocks, or tiles for which it is supplied," it will be realized that its function is very important, since a bad or open joint is an ideal place for corrosion to commence. The cement for use with silica refractories is usually crushed silica with a small proportion of crushed fireclay, ground sufficiently fine to ensure intimate mixing and the use of thin joints. It is desirable that the cement should have a refractoriness under load value comparable with that of the bricks and that its volume change at high temperatures should be similar. The refractoriness under load test will show the temperature at which the contraction becomes appreciable and throw light on its structural stability. This is important when one realizes that in a length of, say, 20 ft. of vertical retort there may be 6 to 8 in. of cement.

In conclusion, let me indicate to what extent silica may be used with advantage in gas-works settings. For reasons mentioned earlier, and notably because of its better underload characteristics, silica gives a greater margin of safety when used in the hottest parts of a setting—for combustion chambers, cross walls, and the hot upper zones of vertical retorts. For horizontal retorts, where carbonization is intermittent, a quick transfer of heat to the charge is necessary if carbonizing time is to be reduced and throughput increased. Silica has a superior conductivity or thermal diffusity at high temperature. Thus there is a greater flexibility by using such a material which can, if required, be worked safely at high temperature in order to increase the therms per retort, and this factor should help greatly in meeting a fluctuating gas consumption caused by atmospheric or other conditions.

HIGH-PRESSURE DISTRIBUTION

By H. RAMSDEN

The development of the Harrogate Gas Company's area of supply during the past fifteen years is very closely linked with the supply of gas at high pressure. Seven undertakings have been purchased, and supplied with gas from the Harrogate Gas-Works through high-pressure mains. In 1925, the Birstwith Gas Company was taken over by the Harrogate Gas Company, and in the following year the Pateley Bridge Gas Company was purchased. The undertakings of the Knaresborough Urban District Council, the Boroughbridge Gas Company, the Tadcaster and Wetherby Gas Company, and the Boston Spa Gas Company were acquired in 1928.

A 6 in. diameter cast iron main was laid to connect the Birstwith Gas-Works with the Harrogate low-pressure system and this was extended to supply Pateley Bridge in the following year.

Steel mains with long sleeve welded joints were used to carry gas at high pressure from the Harrogate Gas-Works to supply the other outlying undertakings. A 6 in. diameter main was laid from Harrogate to Wetherby; a 5 in. diameter main from Wetherby to Boston Spa; and a 4 in. diameter main from Boston Spa to Tadcaster. A 5 in. diameter branch main was taken from the initial 6 in. main to supply Knaresborough, and a 4 in. diameter main reducing to 3 in. diameter was taken forward to supply Boroughbridge. All the

high-pressure mains were tested at 50 lb. per sq.in. air pressure, each individual joint being tested with a solution of soapy water, and a standing test imposed, before the gas was turned on.

Two reciprocating compressors were installed at the Harrogate Gas-Works, each capable of compressing 40,000 cu.ft. of gas per hour at 15 lb. per sq.in. pressure when running at 125 r.p.m. The outlet from the compressors was connected by an 8 in. steel main to a high-pressure receiver, consisting of a converted Cornish boiler, 15 ft. long and 5 ft. diameter. This receiver serves a two-fold purpose, in that it cools to a very appreciable extent the hot high-pressure gas before it is discharged to the district, and also serves to cut out any fluctuations in pressure caused by the compressors. The temperature of the gas leaving the compressors rises as high as 93° F., and the temperature found at the outlet of the receiver is 60° F.

The supply of gas was found to be inadequate for the Pateley Bridge requirements when fed from the Harrogate low-pressure system, and therefore advantage was taken of the high-pressure plant. A 6 in. connexion was made to the high-pressure receiver, and gas supplied into the Pateley Bridge main through a 6 in. Reynolds type governor. This meant that the pressure in this main was raised considerably above normal low-pressure practice, and therefore it was necessary to install governors to cut down the pressure for supplying villages *en route*. Four villages are supplied through governors from this main, and each has its own low-pressure system.

At the present time there are 42 miles of high-pressure mains working at from 8 to 10 lb. per sq.in., and 18 miles of semi-high pressure mains working at from 8 to 12 in. of water gauge, in the Harrogate Gas Company's area of supply.

The manufacturing plant was then closed down and dismantled at each outlying undertaking, gas being supplied under high pressure direct into the existing holders. The retention of the holders enabled gas to be supplied at a much lower pressure than would have been possible if the supply had been obtained direct from the high-pressure main to the district. At the same time, this storage provided a margin of safety if the high-pressure supply was shut off temporarily for repair work to be carried out.

A special holder valve is used which renders the supply of gas to the holders entirely automatic.

At Boroughbridge, a small compressing plant and two high-pressure holders are used to provide a storage for the high-pressure system. A 16 b.h.p. gas engine drives two compressors which can be used singly or together, and each is capable of compressing 3,000 cu.ft. of gas per hour at 50 lb. per sq.in. Each high-pressure holder is 30 ft. long and 9 ft. diameter, and contains 6,000 cu.ft. of gas at 3 atmospheres pressure. These holders feed back into the high-pressure main through a governor, if the pressure in the main falls below 2 lb. per sq.in. With this storage it is possible to isolate a section of the high-pressure main and still maintain the high-pressure supply on each side of the isolated section for a limited time. Also, it enables the low-pressure holder at Boroughbridge to be cut out, if necessary, for repairs, and the supply maintained to the low-pressure system, through a governor, direct from the high-pressure holders.

Branch mains were laid to supply several villages, and extensions have been made in recent years to supply new additions to the Company's area of supply. In 1936, a 4 in. high-pressure main was laid a distance of 2 miles to supply the parish of Thorner. It was found necessary to erect a holder at this place, as the pressure at peak loads in the high-pressure mains falls to a very low point at the extremities of the system. The governors at the end of the high-pressure main ensure that gas can only pass to the holder so long as the pressure is above 1½ lb. per sq.in. The pressure is then broken down at the inlet to the holder by means of a Reynolds type governor, and an automatic holder valve ensures that the gas is shut off when the holder is full. The pressure to the district is controlled through a diaphragm type station governor. With this arrangement, all the control gear is automatic, and the holder is charged only when there is plenty of gas available in the high-pressure system.

Governor Kiosks.

Thirteen villages are supplied with gas direct from the high-pressure main, each village having its own low-pressure system. A 2 in. high pressure service governor, fitted in a steel kiosk above ground level and provided with a by-pass and dial reading pressure gauges on inlet and outlet is used for this purpose. The kiosks are fitted with doors on two sides, and fixed so as to give easy access to the control gear at all points. The chief points in favour of kiosks as accommodation for gas control gear are that all parts are easily accessible for repair, cleaning, and painting, and there is no danger of gas collecting during repair work. Governors fixed in pits beneath the surface of the ground are often neglected due to their inaccessibility and the presence of slime and water. Repair work is often impeded by the lack of ventilation, breathing apparatus having to be worn in many cases.

Individual houses, farms, &c., on the route of the high-pressure main are supplied direct through service governors accommodated in pre-cast concrete chambers below ground level. These chambers are formed of cement and sand mixed with a waterproofing preparation, and are cast in wooden moulds. The walls of the chambers are approximately 2 in. thick, the upper edge of each wall being recessed at the outer edge to receive the pre-cast concrete lid. The fitter can easily fix the chambers without the services of a bricklayer, and after the governor is fixed the holes in the walls at the inlet and outlet services are cemented up, thus forming a watertight chamber. Longthreads are fitted at the inlet and outlet of the governor to enable the governor to be removed without disturbing the chamber.

All high-pressure service governors are fitted with a safety mercury seal, set to blow off at 8 in. water gauge, the outlet of the seal being connected by means of a pipe to discharge at a suitably remote point. This safety seal ensures that in the event of a governor valve failing to shut off tightly the internal pipes and fittings will not be subjected to high-pressure gas, with the consequent danger of escapes.

Service connexions to the high-pressure main are made with the use of a clasp incorporating a Mueller tap. The diameter of the hole drilled in the main is much less than that of the service it is to supply, and depends upon the demand for gas which is likely to occur. The ordinary dwelling house is supplied through an ⅛ in. diameter hole drilled in the steel main. The actual drilling takes place through the plug of the Mueller cock, the small size of the hole restricting the amount of gas which can escape when the drill stand is being removed after the hole is drilled. No trouble has been experienced due to the small hole making up with rust, and experience has proved that a hole the same size as the service is unnecessary. It is important that the wrapping be stripped from the main before the clasp is fixed in position, and then made good when the connexion has been made. If this precaution is not observed, the clasp is gradually drawn into the protective wrapping and the joints are no longer gastight. The high-pressure service is extended to a position adjacent to the building to be supplied, and is terminated by another Mueller cock at the inlet to the governor. In no case is the high-pressure service carried inside the building—the governor being fitted in the open, and the governor outlet connected to a low-pressure service which is carried into the building in the usual manner.

Valves are fixed on the high-pressure line at a distance of approximately 1,000 yd. apart, and receive careful attention. They are turned each month to ascertain that they are working freely, and if any fault is suspected, the valve is completely stripped and overhauled.

Syphons are blown monthly, special syphon cocks being used on the stand pipes.

The area of supply of the Harrogate Gas Company now exceeds 250 sq. miles, and, as the villages and towns supplied are so widely scattered, no other system than high-pressure could be adopted to supply gas satisfactorily to this area. Approximately 200 million cu.ft. of gas is compressed annually at the Harrogate Gas-Works for the purpose of supplying the high-pressure system, and on no occasion, either mechanically or accidentally, has there been any cessation of supply since its installation.

COMPANY MEETING

Imperial Continental Gas Association

The 191st Ordinary General Meeting of the Imperial Continental Gas Association was held on June 2 at Winchester House, Old Broad Street, E.C.

Sir THOMAS ROYDEN, Bt., C.H., the Chairman of the Company, who presided, said that no reminder was necessary of the way in which his hopes of improved political and trading conditions had been disappointed. The state of uncertainty in which we had been living had proved an effectual obstacle to progress of any sort. Nevertheless, sales of gas by the French and Belgian Companies were approximately the same as in 1937, while sales of electricity showed only a very slight decrease. The division of the Association's gas and electricity interests were: Belgium approximately two-thirds gas and one-third electricity; France half gas and half electricity, while in England they were confined solely to electricity. All indications pointed to the progressive development of electricity sales, but the future development of gas was less certain. Since 1929, there had been a steady decline in the gas consumption per consumer on the Continent, in the U.S.A., and in England, due largely to the substitution of electricity for gas for lighting purposes and to more efficient and economical gas appliances, but this had been practically offset by the growth in the number of consumers and by the increasing use of gas for industrial purposes. In 1938, the decline in gas consumption per domestic consumer had ceased in America, so possibly the loss of the lighting load there was almost complete, which development might soon be expected in other countries.

The course of the exchanges between this country and France and Belgium respectively had given less cause for anxiety. During the year, the Belgian franc had shown an appreciating tendency, which in a time of general trade depression had caused some embarrassment to the Belgian exporter. The economic structure in Belgium, however, was sound and would respond very quickly to a definite improvement in world trade; it was still possible to restore equilibrium by a comparatively small reduction in costs, which policy the new Government was apparently determined to pursue. The Belgian Finance Minister had recently stated that to think of devaluing the currency at the present time would not only be a crime, but an absurdity.

It would appear that, if present conditions continued, there was no immediate difficulty in holding the French rate of exchange at around its present figure. The position in France had undergone a remarkable change owing to the measures taken by the present Government as a consequence of the international situation; the 40-hour week had been replaced by one of 45 hours. The 9% increase in electricity production for the first quarter of 1939 showed from the Association's special point of view the progress France was making.

Re-organization and Developments.

The Compagnie Continentale du Gaz had carried through a re-organization of its Lille undertaking, the two sections, gas and electricity, now working more closely together. It had taken a share in a scheme promoted by the French Government for developing the existing interconnections between electric generating stations, so that Lille would be able ultimately to import hydro-electric current at low cost when there was a surplus and to export current generated from coal when the situation was reversed. The Compagnie Industrielle d'Eclairage had won its lawsuit against the Principality of Monaco, which had been ordered by the Court to reinstate the Company in full possession of the gas undertaking. In Belgium additional communes had joined the intercommunal scheme of Provinciale, which gave them a participation in the administration and profits. The coke-oven works of the Cokeries du Brabant continued to be operated on lease by a group of coal owners and others. Magec had reported a diminished turnover in the sale of gas and electrical apparatus owing to unsettled political conditions. Interbrabant, the electrical generating company in which the Association held a substantial minority interest, was engaged upon enlarging its plant. Distrigaz, which retailed coke-oven gas in bulk, continued to progress and was now confronted with the problem of obtaining sufficient supplies to meet the growing industrial demand. Contimeter, which manufactured meters and other gas and electrical appliances, had recently placed upon the market a gas water-heater which was being favourably received. The Société Chimique de Selzaete had increased the throughput of its Works by an arrangement with one of the leading Belgian Gas Groups to undertake the distillation of their tar.

Abair Engineering specialized in air-conditioning work and held the sole British rights for the Capillary Cell system, the advantages of which were becoming widely known. During 1938 an A.R.P. section was inaugurated to undertake comprehensive schemes of A.R.P. protection in accordance with Home Office recommendations.

The Accounts.

Turning to the accounts, the fixed assets of £95,975 consisted entirely of freehold and leasehold premises in London and Belgium, the small gas undertaking at Graslitz having been sold in July last. The Association was now a 100% holding company, with its investments concentrated in England, Belgium, and France. The latest valuation of the investments in subsidiary and allied companies showed a comfortable surplus over the book figure of £9,517,000. There had been an increase in the number of Edmundsons Electricity Corporation shares held owing to a 50% bonus issue made by that Company to bring the issued capital into line with the real asset value. The dividend, however, had been reduced from 9% to 6%, and it was, therefore, from the previous issue of one new share, at the price of 30s. for each five held, that an increase of income was being obtained.

Advances to Subsidiaries.

Advances to subsidiary companies showed a decrease of £262,000; deposits by them an increase of £76,000 and one of the Belgian subsidiaries had bought from the Association certain minor Belgian investments to a value of £55,000. The availability of these funds, *plus* the proceeds of some land sales, had enabled the Association to repay a bank loan of £61,000; to increase its cash by £289,000; to pay out £127,000 in the purchase of its debenture stock for cancellation and to have a surplus for investment as and when opportunities offered. Sterling assets amounted to 27% of the whole, while sterling liabilities had been reduced by the equivalent of a further 2%, after deducting the remaining sterling liabilities, £100 stock was represented, at current market values, by £45 of sterling assets, including cash.

Out of the total of £507,000 under sundry creditors and provisions, only £57,000 was actually owing to third parties.

The Association's income from dividends, &c., had fallen by £25,000. The special distribution from reserves made last year by the Compagnie Continentale through the realization of French Government and other securities had been brought into this year's revenue to the extent of £58,000. In addition, an ordinary dividend had been received of a sterling value of £85,000. The Belgian investments had yielded £315,000 as against £325,000 last year, the average rates of exchange on the respective dates of payment being Frs. 139 and 147. An extra £7,000 had been received from Edmundsons Electricity Corporation, but the final dividend of 3½%, just declared, would be brought into next year's accounts, the effect of which, if the Company maintained the previous interim dividend, would be to increase next year's income from this source by a further £11,000.

The Belgian companies having considered that in the event of war their normal financial relations with the Association might be difficult, thought it proper to reinforce their financial positions —*e.g.*, Contibel had placed to reserve Frs. 19,155,000 (£137,500) as against Frs. 10,535,000 (£71,500) last year. Actually there was a comfortable margin in the consolidated earnings of the group over the amount proposed for dividend, but although the gross franc earnings showed an increase on last year, the net earnings, after providing for depreciation and taxation, declined by approximately £45,000.

The net profit for the year of £415,786, out of which it was proposed that £406,000 should be applied in payment of a 10% dividend, less tax, would permit the carry-forward to be increased by £9,786 to £526,155.

The Board regarded a substantial Carry Forward as a reserve against the interruption of foreign dividends in the eventuality of war. Possibly a larger distribution would be able to be made from Belgian sources next year, while there would be the increased revenue from Edmundsons and the smaller Debenture liability.

The report and accounts were unanimously adopted.

TRADE NEWS

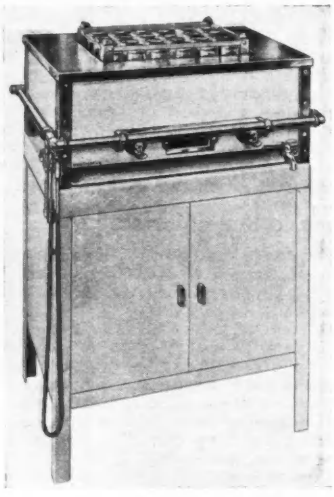
What the manufacturers are doing by way of new and improved appliances, plant, and processes.

"Visco" Unit Dust Collectors.

From the Visco Engineering Company, Ltd., Croydon, we have received a copy of their new catalogue, No. 395, of unit dust collectors for grinding machines, polishing buffs, &c. In the opening paragraphs of this illustrated booklet attention is drawn to the fact that with the ever-increasing use of abrasive wheels in industry it is essential that special precautions be taken to prevent the dangerous light airborne dust given off by grinding and polishing machines from adversely affecting the health of the workers.

A New Gas-Heated Milk Warmer.

Radiation Ltd. have recently produced a gas-heated milk warmer —The "Multiserve"—which should be of interest to the Industry —having a wide field of use among Education Authorities for installation in schools, while it should also find useful application among industrial and commercial firms for works and office canteen purposes.



With the standard size of this appliance, as many as 24 bottles of milk, each holding ½ pint, can be (*a*) brought rapidly to the right temperature for drinking and (*b*) kept at that exact heat for any length of time without attention. There is no fear of overheating the milk, nor risk of cooling during distribution to staff. The warming chamber underneath enables 96 standard ½ pint bottles to be stored and kept warm, while the upper heating unit is fully charged. The accompanying illustration shows the "Multiserve" with milk bottle container loaded.

The "Multiserve" milk warmer satisfies the most exacting standards of hygiene, being finished in white porcelain enamel with chromium plated fittings, the whole being very easy to keep clean. The warming chamber is heated by a gas burner, and a gas match can be supplied as a useful extra. The appliance may be obtained either with or without the warming chamber.

Cardiff Stockyard for Staveley Company.

The Staveley Coal and Iron Company, Ltd., have opened an office in Cardiff, to which is attached a stockyard from which they can give immediate delivery of all descriptions of cast-iron pipes and specials from 2 in. to 12 in. diameter. The local representative is Mr. H. J. Starns, and the address G.W. Railway Gabalfa Sidings, Mynachdy Road, Cardiff. Telephone No. Cardiff 2446.

Large Cooking Equipment.

The latest addition to the large-scale equipment manufactured by Radiation Limited is the "Langham" vegetable boiler. This handsome production is robustly constructed and has a rustless cast-iron pan with special combustion liner, heavily insulated and mounted on a supporting cylinder of strong construction. A lift-off lid is supplied as standard, but a counter-balanced lid can be fitted as an extra. The burners, which can easily be removed for cleaning, are provided with flash ignition for convenience when lighting. The injectors and gas box are enclosed, while a mirror provides easy visual examination of the burner flame. The whole is mounted on a strong pedestal base of pleasing design. The "Langham" is finished in mottled enamel with chromium-plated lid with tinned inside, aluminium outer casing (stainless steel casing supplied as an extra), with insulated taps; draw-off tap and mirror fittings are in chromium plate. With black finish, the boiler has a polished copper lid, tinned inside, blue steel outer casing (aluminium casing extra), brass draw-off and burner taps.

We have received from Radiation Ltd. new and replacement pages for inclusion in their Large Cooking Equipment Catalogue.

Precision Instruments.

Attractive publicity literature is being published from time to time by Messrs. Rotherham, of Coventry. The firm specialize in engineering and precision instrument making and the diversity of products featured in their latest publicity literature bears eloquent testimony to the extent of their activities. Small parts with a purpose are the firm's speciality; their size is no indication of their importance. They are also prepared to manufacture specialities to client's special orders.

"Portcullis" Overhead Radiant Heaters.

The advantages of radiant heating are now familiar to the members of our Industry and with this method Messrs. Bratt Colbran, Ltd., has become very largely identified through their development of the "Portcullis" overhead radiant heater. A very informative booklet has now been published by Messrs. Bratt Colbran dealing fully with such aspects of radiant heating as types of heater available, performance, methods of control, general advantages, and fixing and adjusting. The firm gratefully acknowledge the help of those in the Industry who have contributed data, photographs, &c., and assisted in the production of this admirable booklet, which will be of real assistance in the solution of many heating problems.

A New Gas Street Lamp by Sugg.

A new gas street lamp has been produced by William Sugg & Co., Ltd., which embodies a number of interesting features. Named the "Trafalgar," it is a general utility unit at only slightly greater cost than the ordinary square lantern, but has the advantage of much more modern appearance with its copper body, painted green, heat-resisting quality glass, and reflector and shaft of enamelled iron. The top windguard cover is easily removed for cleaning purposes, and the lantern is capable of taking up to four No. 2 size mantles in its small diameter of 16 in. Other dimensions are overall height from bottom of frog to top of ball ornament, 35 in.; and height from bottom of frog to mantle, 18 in. The lamp is supplied with ½ in. barrel size levercock, by-pass, constant pressure governor, gas supply tube, gas and air regulators, mantles, nozzles and connexions for, but exclusive of, clock controller. "Multi-ray" reflectors can be employed with this lantern.

The Art of Make-Up.

"The Art of Make-Up for Business Men" is a complete break-away from the usual type of publicity literature. It is unusually readable and amusing throughout, but at the same time it conveys its message—the capacity of Messrs. John Harper's plant for manufacturing widely differing types of work to customers' specifications. Certain portions of the booklet are applicable to the Gas Industry, and we feel sure our readers will find it of much interest. The address of John Harper & Co., Ltd., is Albion Works, Willenhall, Staffs.

Athletic and Social

Croydon Co-Partnership.

Continued progress in the co-partnership scheme of the Croydon Gas Company was reported at the annual meeting of the Co-partners held at the North End Hall, Croydon, on May 22.

There was a very large attendance, and Mr. William Cash, J.P. (Chairman of the Company), presided.

Thanks to the Directors and management of the Company, and appreciation of the benefits derived by co-partnership, were expressed by Mr. J. L. Bates (Secretary of the Co-partners' Representatives on the Co-partnership and Works Joint Committee). He referred with pleasure to the continued success of the Company in surmounting the difficult periods experienced during the past year and for the continuance of the bonus of 7% in spite of increasing costs. Again, an additional contribution had been given by the Directors to the pensions fund. The outstanding feature resulting from meetings between the committee and officers of the Company was the permanent allocation of part of the bonus to stock in the Company.

Commenting on the report, Mr. Cash said that the bonus amounted to £15,590, an increase of over £519 on the previous year. He attributed this increase mainly to the fact that there were twenty-three more co-partners. The average sum per co-partner now worked out at £13 4s. 3d., and the balance to the credit of co-partners held on March 31 was £56,544. He announced that the scheme to assist hospitals had again done very well. Since it was started in 1925 the total payments made to hospitals were £3,250. The Hospital Saving Association now had a membership of 643.

After references to the satisfactory position with regard to investments, the Chairman spoke of the progress of air raid precautions, and referred to the erection of the new offices. He dealt with the results of the Company last year, mentioning the extensions to mains and the opening of two new showrooms. Although every one of the London Companies had had to increase the price of gas, the Croydon Company had not done so. The last thing they wanted to do, unless it was absolutely necessary, was to increase the price of gas.

A warm tribute to the staff was paid by Mr. W. J. Sandeman (General Manager), who said that they had experienced an extraordinarily difficult year. He thanked Mr. Cash on behalf of the gathering. Mr. Cash, he said, had been a Director of the Company for forty years and had been Chairman of the Board for the past twelve years. During that time the Company had made wonderful progress.

Mr. Cash then presented long-service awards to the following employees, who have completed twenty-five years with the Company: C J. Baker, E. Baker, A. H. Brown, W. Buckell, E. Bushell, A. Chalkley, F. G. Cluer, W. Coleman, S. H. Davies, E. W. Easthope, G. L. Elger, A. F. Gambles, J. M. Goddard, W. G. Green, C. T. Hopkins, A. A. Hughes, G. S. Hutchinson, C. J. Kent, H. B. Lambert, C. W. Pearce, C. Piggott, G. C. Sines, W. H. Skilton, W. Stockdale, W. G. Titchener, T. F. A. Tullett, J. M. Vaughan, W. Vidler, A. J. Vigar, W. H. Websdale, L. W. Weedon, A. West and A. G. Wickenden.

Light refreshments and a concert concluded the evening.

Edinburgh Football Success.

Edinburgh Gas Department Football Club beat Bruce Peebles Club by 3 goals to 2 in the final of play for the Brunton Cup at New Meadowbank last week.

London Gas Bowling Association.

The Semi-Finals and Final of the 1938 Competition for the Charles Carpenter Cup was played on the Green of the Wandgas Bowls Club, Merton Road, Wandsworth, on May 13, by kind permission of the Management of the Wandgas Athletic Association. The international crisis of September, 1938, was the cause of postponement.

The finalists of the Divisions were H. W. Ginn (Gas Light East), G. Martin (South Suburban), W. Oakes (holder, Gas Light West), and A. Paskell (Tottenham).

In the Semi-finals W. H. Ginn played superb bowls, easily beating G. Martin by 21 points to 5. W. Oakes was a little late in finding his form against A. Paskell, allowing his opponent to get a lead of 6 before making a start, and as the game went on Oakes eventually got even with Paskell at 18 points, but Paskell, by clever bowling, got 3 singles, which put him into the final. The Final proved a real exhibition of bowling. Ginn proved to be the winner, and the Gas Light Sports Association thus retain the trophy.

After the match Mr. E. Jones (Metrogas), President of the Association, asked Mr. J. L. Hawkins (Gas Light West), Immediate Past-President, to present the Cup. Mr. Ginn, in acknowledging his appreciation of Mr. Hawkin's congratulatory remarks, complimented the Wandgas Green Ranger for the splendid condition of the green, followed by a vote of thanks to the Wandgas Athletic Association for the loan of their green for the games.

AN INVITATION . . . .

View of the entrance hall and waiting room.

Messrs. Thomas Potterton (Heating Engineers) Ltd., extend a hearty invitation to those who are visiting the Wandsworth Works of the Wandsworth & District Gas Company on Thursday afternoon, June 8, to come along afterwards and inspect their new offices and works at Buckhold Road. Cars can be left in their park which is only two minutes walk from Wandsworth High Street.

THOMAS POTTERTON (Heating Engineers), Ltd.,

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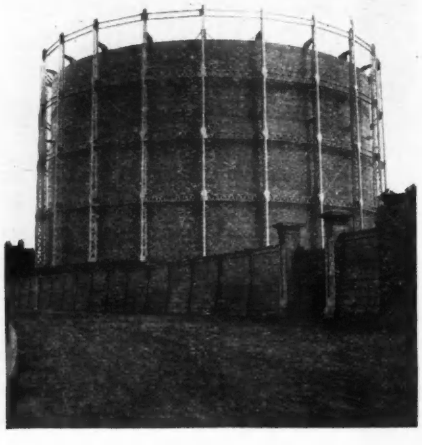

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Markets and Manufactures

Current Sales of Gas Products

The London Market

June 5.

There is little change to report in the London Tar Products market, to-day's values being as follows:

Pitch, nominal, at about 25s. to 26s. per ton f.o.b.

Creosote, about 3½d. to 3¾d.

Refined tar, 3¾d.

Pure toluole, about 2s. 5d. to 2s. 6d.

Pure benzole, about 1s. 9d.

95/160 solvent naphtha, 1s. 7d. to 1s. 8d.

90/160 pyridine, about 11s.

All per gallon naked at makers' works.

The Provinces

June 5.

Crude Gas-Works Tar, 12s. to 17s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 27s. to 28s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 27s. to 28s.* Toluole, naked, North, 1s. 10d. to 1s. 11d. Coal tar, crude naphtha, in bulk, North 7¾d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 2½d. to 1s. 3d. Creosote, *ex* works, in bulk, North, liquid and salty, 3¾d. to 4¼d.; low gravity, 4d. to 4½d. Carbolic acid, 60's, 1s. 7d. to 1s. 10d. Naphthalene, £13 10s. to £16. Salts, 70s. to 75s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsaleable. Heavy oil: Unfiltered anthracene oil, min. gr. 1,080, 4¾d. to 4¾d.; filtered anthracene oil, min. gr. 1,080, 5¼d. to 5¾d.; heavy tar oil, gr. less than 1,080, 4¼d. to 4¾d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

Scotland

GLASGOW, June 3.

Prices remain easy with competition keen. If anything, there has been an increase in the volume of business placed in the home market during the week.

Crude gas-works tar.—Actual value is about 29s. to 30s. per ton *ex* works in bulk.

Pitch of vertical quality is being held for about 20s. to 21s. per ton f.o.b. for export and round 20s. per ton *ex* works in bulk for home trade.

Refined tar.—Numerous county contracts are now being placed at 3¾d. to 4d. per gallon, while for export value is easy at 2¾d. to 3d. per gallon, both into buyers' packages at makers' works.

Creosote oil.—Demand is on moderate lines, but makers' prices show no alteration as follows: Specification oil, 3½d. to 3¾d. per gallon; low gravity, 4¼d. to 4½d. per gallon; neutral oil, 3¾d. to 4d. per gallon; all *ex* works in bulk.

Cresylic acid.—Business is very limited, and supplies can be secured at the following prices: Pale, 97/99%, 1s. 2d. to 1s. 3d. per gallon; dark, 97/99%, 1s. to 1s. 1d. per gallon; pale, 99/100%, 1s. 4d. to 1s. 7d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is quietly steady at round 5d. to 5½d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is now quoted at 1s. 4d. to 1s. 5d. per gallon, and 90/190 heavy naphtha is about 1s. 1½d. to 1s. 2d. per gallon.

Motor benzole is unchanged at 1s. 3d. to 1s. 4d. per gallon.

Pyridine, being scarce, is now valued at 9s. 6d. to 10s. 6d. per gallon for 90/160 grade. The 90/140 grade is nominal at 11s. 6d. to 12s. 6d. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.		
Crude benzole..	0	9½	to	0	10	per gall.	at works
Motor „ ..	1	3	„	1	3½	„	„ „
90% „ ..	1	4	„	1	4½	„	„ „
Pure „ ..	1	8	„	1	8½	„	„ „

Contracts Advertised To-Day

Coal.

Abertillery Gas Department. [p. 762.]
Borough of Chorley. [p. 762.]

Coke Handling, Grading, and Storage Plant.

Borough of Tipton Gas Department. [p. 762.]

Painting Gasholder.

City of Stoke-on-Trent Gas Department. [p. 762.]

Purifier Boxes.

Stratford-upon-Avon Gas Department. [p. 762.]

Reconstruction of Retort Benches.

Glasgow Corporation Gas Department. [p. 762.]

Vertical Retorts.

Borough of Tipton Gas Department. [p. 762.]

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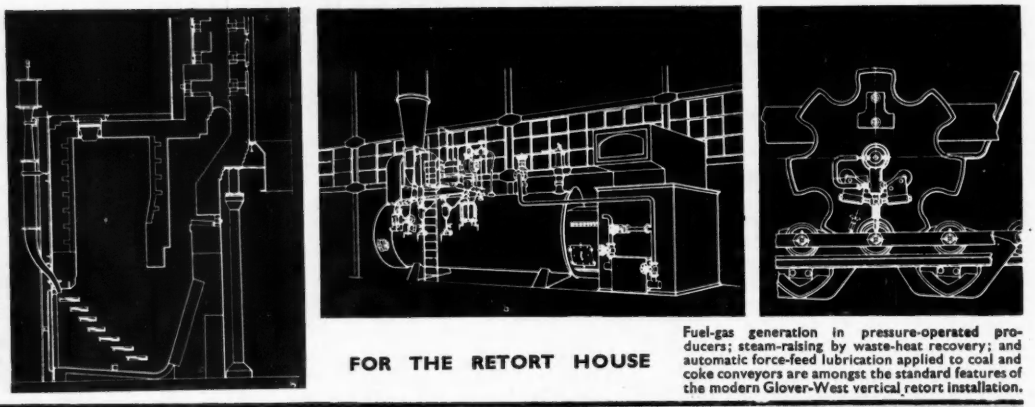

FOR THE RETORT HOUSE

Fuel-gas generation in pressure-operated producers; steam-raising by waste-heat recovery; and automatic force-feed lubrication applied to coal and coke conveyors are amongst the standard features of the modern Glover-West vertical retort installation.

WEST'S

CARBONIZING PLANTS

***Blackpool's new carbonizing plant will be* GLOVER-WEST VERTICALS**

WORK is proceeding on a 72-retort installation of Glover-West vertical retorts at the new Marton gas works for the Blackpool Corporation Gas Department. The plant will be equipped with pressure type producers, waste-heat boilers, dust extraction and air-conditioning plants, together with extensive coaling equipment and coke handling, cutting, grading and de-dusting units. The drawing shows the architectural design of the retort house and coke plant.

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435 INSTALLATIONS BUILT OR ORDERED IN 24 COUNTRIES

GAS STOCKS AND SHARES

The past week on the Stock Exchange saw a further extension of business in all sections with rising prices. The general feeling is one of confidence in the future with the strong belief, which it is hoped will be justified, that a disastrous outcome of the European situation will not materialize. Gilt-edged stocks, although closing below the best of the week, were firm and home rails remained steady. Considerable activity took place among industrials with prices closing on the upgrade, while oil, rubber, and mining shares also received their share of support. A certain amount of profit-taking was in evidence towards the end of the week, and this was sufficient for prices to ease below their best, but probably any reactions on this score will have been recovered by now in the current week.

The gas market participated in the greater activity and a number of stocks increased in value. Imperial Continental continued the upward movement and closed 4 points higher at 127½, transactions at one time being recorded at 131. Portsmouth gained 7 to 147, and Plymouth 5 to 120. Commercial moved up 3 points to 57½ and is still undervalued, the yield working out at over 7½%. Tottenham recovered 4½ points to 114½, and it will be seen that several fixed-interest stocks also hardened. The only reaction of note was a fall of 7 points in Bournemouth sliding-scale to 190, the stock changing hands during the week at 186.

With the exception of a fractional increase in Newcastle 4% preference, prices at the Provincial Exchanges and in the Supplementary List closed unchanged.

In the list of debenture stocks on offer at the present time appears a parcel of £50,000 Sheffield Gas 4% at 102½ free, giving a gross flat yield of £3 18s.%, or £3 16s. 3d. after allowing for redemption. The stock is redeemable at par in 1959-64, and the first payment of interest in July accrues from April 28 last.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 2.	Rise or Fall on Week.
1,767,439	Mar. 6	8	8	Alliance & Dublin Ord. ...	130—140	...
374,000	Dec. 19	4	4	Do. 4 p.c. Deb. ...	90—95	..
877,576	May 8	5	5	Asscd. Gas & Water U'd'ts Ord.	16/6—18/6	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/—	...
318,730	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	16/—18/—	...
750,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	92—57	...
560,070	Feb. 20	7	7	Barnet Ord. 7 p.c.	153—158	...
300,000	Apl. 6	1/4⅝	1/9⅜	Bombay, Ltd.	18/6—20/6	...
181,185	Feb. 20	9½	9½	Bournemouth sliding scale ...	185—195	—7
690,526	,,	7	7	Do. 7 p.c. max. ...	153—158	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	127—132	...
50,000	Dec. 19	3	3	Do. 3 p.c. Deb. ...	70—75	...
362,025	,,	4	4	Do. 4 p.c. Deb. ...	95—100	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	110—115	...
357,900	Feb. 20	7½	7½	Brighton, &c., 6 p.c. Con. ...	135—140	...
659,955	,,	6½	6½	Do. 5 p.c. Con. ...	118—123	..
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	110—120	..
855,000	Mar. 20	7	8	British Ord.	107—117	..
100,000	Dec. 19	7	7	Do. 7 p.c. Pref.	138—143	..
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	..
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	93—98	..
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	..
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	..
100,000	22May'33	6	4	Cape Town, Ltd.	¾—1½	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—2	...
150,000	Dec. 19	4½	4½	Do. 4½ p.c. Deb. ...	60—70	..
626,860	Feb. 6	6	6	Cardiff Con. Ord.	112—117	..
237,860	Dec. 19	5	5	Do. 5 p.c. Red. Deb. ...	103—108	..
98,936	Mar. 20	2/—	2/—	Colombo Ord.	1⅛—1⅜	...
24,510	,,	1/4⅜	1/4⅜	Do. 7 p.c. Pref. ...	22/—24/—	...
739,453	Mar. 20	—/11·48	—/11·48	Colonial Gas Assn. Ltd. Ord.	16/—18/—	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref. ...	23/—25/—	...
1,775,005	Jan. 23	5	4	Commercial Ord.	55—60	+3
140,000	Feb. 6	§13/4	4	Do. 4 p.c. Red. Pref. ...	95—100	..
620,000	Dec. 5	3	3	Do. 3 p.c. Deb. ...	60—65	..
286,344	Feb. 20	5	5	Do. 5 p.c. Deb. ...	105—110	+2
200,000	,,	4§	4	Do. 3½ p.c. Red. Deb. ...	95—100	...
807,560	Feb. 20	7	7	Croydon sliding scale ...	123—128	..
644,590	,,	5	5	Do. max. div.	94—99	..
620,385	Dec. 19	5	5	Do. 5 p.c. Deb. ...	108—113	..
239,000	Feb. 6	5	5	East Hull Ord. 5 p.c.	88—93	..
187,215	Feb. 6	6	6	East Surrey Ord. 5 p.c. ...	102—107	—3
176,211	Dec. 5	5	5	Do. 5 p.c. Deb ...	107—112	...
250,000	Nov. 7	8	4	Gas Consolidation Ord. 'B' ...	19/—21/—	...
250,000	May 22	4	4	Do. 4 p.c. Red. Cum. Pref.	17/—19/—*	...
19,189,963	Feb. 6	5§	5§	Gas Light & Coke Ord. ...	21/3—22/3a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	68—73	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	91—96	...
2,993,000	Jan. 9	3½	3½	Do. 3½ p.c. Red. Pref. ...	92—57	...
8,602,497	May 22	3	3	Do. 3 p.c. Con. Deb. ...	70—75*	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	105—110*	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	102—107*	+1
700,000	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
270,466	Feb. 20	6	6	Harrogate New Cons. ...	93—103	...
157,500	Mar. 20	‡1/—	‡1/—	Hong Kong and China Ord. ...	⅞—1	...
213,200	Feb. 6	5§	6	Hornsey Con. 3½ p.c. ...	97—102	...
5,600,000	May 8	8	12	Imperial Continental Cas. ...	125—130	+4
172,810	Jan. 23	3½	3½	Do. 3½ p.c. Red. Deb. ...	87—92	...
235,242	Mar. 6	8½	8½	Lea Bridge 5 p.c. Ord. ...	145—155	...
63,480	Dec. 19	3	3	Maidstone 3 p.c. Deb. ...	58—63	...
45,000	May 22	†10	†10	Malta & Mediterranean ...	125—130*	...
				Metropolitan (of Melbourne)		
392,000	Apl. 6	5½	5½	5½ p.c. Red. Deb.	98—100	...
231,977	Feb. 20	5	5	M.S. Utility 'C' Cons. ...	95—100	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref. ...	83—88	...
390,076	Dec. 19	4	4	M.S. Utility 4 p.c. Deb. ...	90—95	...
148,955	,,	5	5	Do. 5 p.c. Deb. ..	107—112	...
125,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Eds.	94—97	...
675,000	May 8	†6	†3	Montevideo, Ltd.	63—68	...
250,000	Mar. 6	7½	7½	North Middlesex 6 p.c. Con.	135—140	...
396,160	Feb. 6	5	5	Northampton 5 p.c. max. ...	103—108	...
300,000	April 24	†9	†7	Oriental, Ltd.	135—145	...
468,537	Dec. 5	8	7½	Plymouth & Stonehouse 5 p.c.	115—125	+5
621,667	Feb. 20	8½	8½	Portsmouth & Gosport Cons.	142—152	+7
241,446	,,	5	5	Do. 5 p.c. max. ...	98—103	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
75,000	,,	4	4	Do. 4 p.c. Pref. ...	82—87	...
114,000	Feb. 6	5	5	Preston 5 p.c. Pref.	102—107	...
247,966	Dec. 19	4	4	Primitiva 4 p.c. Cons. Deb. ...	96—101	...
625,959	Jan. 9	4	4	Do. 4 p.c. Red. Deb. ...	94—99	...
15,000	Mar. 6	6	6	San Paulo 6 p.c. Cum. Pref. ...	7⅞—8⅛	—¼
441,275	May 8	1/1⅛	1/1⅛	Severn Val. Gas Cor. Ld. Ord.	20/—22/—	...
460,810	Mar. 20	—/10⅝	—/10⅝	,, ,, 4½ p.c. Cum. Pref.	19/—21/—	...
133,201	Mar. 6	8½	5	Shrewsbury 5 p.c. Ord. ...	141—146	...
9,000	June 3	4	‡4	South African Ord.	4½—5½	...
1,371,752	April 24	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	20/6—22/6	...
871 636	Mar. 6	—/10⅜	—/10⅜	Do. 4½ p.c. Red. Cum. Pref.	19/—21/—	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	17/—19/—	...
450,000	Feb. 6	4	4	Do. 4 p.c. Deb.	95—100	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
6,709,695	Feb. 6	5	6	South Met. Ord.	91—94	..
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	118—123	..
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	88—90	...
1,695,445	Dec. 19	3	3	Do. 3 p.c. Deb.	67—72	..
1,000,000	Jan. 9	5	5	Do. 5 p.c. Red. Deb. ...	108—110	+½
600,000	,,	§31/—	3½	Do. 3½ p.c. Red. Deb. ...	92—98	...
1,543,795	Jan. 23	6	6	South Suburban Ord. 5 p.c. ...	108—110	...
512,825	,,	5	5	Do. 5 p.c. Pref.	102—108	...
500,000	,,	4	4	Do. 4 p.c. Pref.	88—90	...
250,000	,,	3½	3½	Do. 3½ p.c. Red. Pref. ...	90—95	...
888,587	Dec. 5	5	5	Do. 5 p.c. Deb.	109—114	+2
250,000	,,	4	4	Do. 4 p.c. Deb.	90—95	...
200,000	Feb. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
427,859	Apl. 6	9⅜	1/2⅜	S. Western Gas & Water Ord.	15/6—17/6	...
160,523	Apl. 6	—/10⅜	—/10⅜	Do. 4½ p.c. Red. Cum. Pf.	18/6—20/6	...
110,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
750,541	Feb. 6	5	5½	Southampton Ord. 5 p.c. ...	104—109	...
148,836	Dec. 19	4	4	Do. 4 p.c. Deb.	90—95	...
350,000	Feb. 6	5½	5½	Swansea 5½ p.c. Red. Pref. ...	104—109	...
200,000	Dec. 19	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
1,076,490	Feb. 20	6⅝	6⅝	Tottenham and District Ord.	112—117	+4½
409,835	,,	5½	5½	Do. 5½ p.c. Pref.	110—115	...
62,235	,,	5	5	Do. 5 p.c. Pref.	103—108	...
453,360	Dec. 5	4	4	Do. 4 p.c. Deb.	90—95	...
85,701	Jan. 9	6	6	Tuscan 6 p.c. Red. Deb. ...	95—100	...
1,131,550	May 8	4	6	U. Kingdom Gas Cor. Ord. ...	15/6—17/6	...
1,051,280	May 8	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	17/—19/—	...
762,241	,,	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	18/—20/—	...
745,263	Dec. 19	4½	4½	Do. 4½ p.c. 2rdNon-Cum.Pf.	14/—16/—	...
1,066,186	Mar. 6	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	120—125	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	102—107	...
1,371,138	Jan. 23	7	7	Wandsworth Consolidated ...	112—117	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	85—90	...
1,343,964	Dec. 19	5	5	Do. 5 p.c. Deb. ...	109—114	+2
383,745	,,	4	4	Do. 4 p.c. Deb. ...	90—95	...
400,000	,,	§25/—	3½	Do. 3½ p.c. Red. Deb. ...	93—98	..
558,342	Feb. 6	6⅞	6⅞	Watford and St. Albans Ord.	105—115	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	102—107	+4
200,000	,,	5½	5½	Do. 5½ p.c. Pref. ...	110—115	..
200,000	,,	§16/8	4	Do. 4 p.c. Rd. Pf. (1973 8)	53—58	..
100,000	—	—	—	Do. 4 p.c. Red. Pf. (1959)	97—102	..
200,000	Dec. 19	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
200,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations June 2.	Rise or Fall on Week.
202,152	Mar. 20	5	5	Ascot Ord.	99—104	...
128,182	Dec. 19	5	5	Do. 5 p.c. Pref.	102—107	...
31,035	Mar. 20	–/4⅛	–/4⅛	Associated Utilities 4 p.c. Pref.	15/—17/–	...
100,000	Dec. 19	3⅛	3⅛	Do. 3¼ p.c. Red. Deb. ...	95—100	...
17,000	Feb. 20	8	8	Bognor Orig. Ord. 'A' ...	140—150	...
62,210	,,	8	8	Do. New Addl. 'A' ...	140—150	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	135—145	...
37,440	Feb. 6	10	10	Cam. Univ. & Town 10 p.c. max.	165—175	...
125,970	,,	7	7	Do. 7 p.c. max.	115—125	...
39,025	,,	5	5	Do. 5 p.c. max.	95—100	...
96,410	Feb. 6	4½	4½	Cardiff 4½ p.c. Pref.	93—98	...
150,000	Feb. 20	4	4	Croydon 4 p.c. Pref.	91—96	...
130,000	Dec. 19	4	4	Do. 4 p.c. Deb.	92—97	...
65,000	Mar. 6	7⅛	7⅛	Eastbourne 'A' 5 p.c. ...	122—132	...
198,000	,,	6	6⅛	Do. 'B' 3½ p.c.	105—115	...
112,312	,,	5	5	Do. 5 p.c. Pref.	102—107	...
130,000	Dec. 19	5	5	Do. 5 p.c Deb.	107—112	...
24,000	Feb. 20	8⅛	8⅛	Great Yarmouth 8⅛ p.c. max.	30—35	...
59,400	,,	7⅛	7⅛	Do 7⅛ p.c. max.	27—32	...
51,160	Dec. 5	5⅛	5⅛	Do. 5⅛ p.c. Deb.	117—122	...
152,600	Feb. 20	8	9	Guildford Cons.	150—160	...
54,055	,,	5	5	Do. 5 p.c. Pref.	102—107	...
68,250	Dec. 19	5	5	Do. 5 p.c. Deb.	105—110	...
156,600	Feb. 20	7	7	Hampton Court Cons. ...	103—113	...
80,000	Mar. 6	4	4	Lea Bridge 4 p.c. Pref. ...	82—87	...
60,000	,,	6	6	Do. 6 p.c. Pref.	118—123	...
94,876	Dec. 5	4	4	Do. 4 p.c. Deb.	87—92	...
73,620	Mar. 6	8⅛	8⅛	Luton Cons. 'A'	150—160	...
107,960	Mar. 20	4	5⅛	Mid Kent Ord.	8¾—9¼	...
230,940	Feb. 6	10	10	Oxford & District Ord. ...	165—175	...
47,112	,,	5	5	Do. 5 p.c. Pref.	102—107	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	May 8	7⅛	7⅛	Peterborough Ord.	134—139	...
64,990	Mar. 6	7⅛	7⅛	Redditch Ord....	115—125	...
166,850	Feb. 6	8	8	Romford Ord....	137—142	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—102	...
44,000	Mar. 20	5	5	Do. 5 p.c. Deb.	107—112	...
25,570	Feb. 6	5⅛	5⅛	Rugby 5⅛ p.c. Pref.	118—123	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	Dec. 5	5⅛	5⅛	Do. 5⅛ p.c. Deb.	115—120	...
110,950	Feb. 20	8	8	Ryde Ord.	137—147	...
270,086	Mar. 20	7	7	Slough Ord.	120—130	...
21,000	Dec. 19	5	5	Do. 5 p.c. Deb.	105—110	...
28,872	May 8	5⅛	5⅛	S. Midland Gas Cpn. Ltd. Ord.	16/—18/–	...
28,866	Mar. 6	4⅛	4⅛	Do. 4⅛ p.c. Red. Cum. Pref.	17/—19/–	...
117,228	Feb. 20	5	7	Swindon Cons.	100—105	...
60,425	Dec. 5	5	5	Do. 5 p.c. Deb.	105—110	...
64,380	Dec. 19	5	5	Torquay & Paignton 5 p.c. Pref.	102—107	...
130,000	Feb. 6	5	8	Wakefield Ord.	116—121	...
81,650	,,	5	5	Do. 5 p.c. max.	92—97	...
82,000	Jan. 23	6	6	Weymouth Ord.	101—106	...
98,384	Feb. 6	6	6	Wolverhampton 6 p.c. Pref.	115—120	...
160,000	Dec. 19	5⅛	5⅛	Do. 5⅛ p.c. Rd. Db.	103—108	...
90,000	Dec. 19	5	5	York 5 p.c. Red. Deb. ...	102—107	...
133,640	Feb. 20	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	115—120	...
120,000	,,	5	5	Do. 5 p.c. Pref.	102—107	...
35,000	Dec. 5	5⅛	5⅛	Do. 5⅛ p.c. Deb.	112—117	...

BRISTOL EXCHANGE

Issue £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 2.	Rise or Fall on Week.
347,756	Feb. 6	5	6	Bath Cons.	115—117	...
1,667,250	Feb. 6	5	5	Bristol, 5 p.c. max.	105—108	...
120,420	Dec. 19	4	4	Do. 1st 4 p.c. Deb. ...	98—101	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	98—101	...
328,790	,,	5	5	Do. 5 p.c. Deb.	115—118	...
274,000	Feb. 20	5	5	Newport (Mon.) 5 p.c. max. ...	95—97	...
13,200	Mar. 20	7	8⅛	Pontyp'l Gas & W. 10 p.c. 'A'	12⅛—13½	...
13,600	,,	6	5	Do. 7 p.c. 'B' ...	11½—12	...
40,000	,,	6	5	Do. 7 p.c. 'C' ...	11½—12	...
140,778	Feb. 6	5	5	Weston-super-Mare Cons. ...	103½—105½	...
64,338	Dec. 19	4	4	Do. 4 p.c. Deb. ...	98—101	...
33,340	,,	7⅛	7⅛	Do. 7⅛ p.c. Deb. ...	149—152	...

LIVERPOOL EXCHANGE

Issue £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 2.	Rise or Fall on Week.
157,150	Feb. 6	5	6½	Chester 5 p.c. Ord.	107—110	...
92,500	Dec. 19	4	4	Do. 4 p.c. Pref.	95—99	...
36,430	,,	3½	3½*	Do. 3½ p.c. Deb.	87—90	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 20	6	6	Liverpool 5 p.c. Ord.... ...	117—119	...
245,500	Dec. 19	5	5	Do. 5 p.c. Red. Pref. ...	100—105	...
306,083	Jan. 23	4	4	Do. 4 p.c. Deb.... ...	99—101	...
106,280	Feb. 6	10	10	Preston 'A' 10 p.c.	177—187	...
188,219	,,	7	7	Do. 'B' 7 p.c.	129—139	...

NEWCASTLE EXCHANGE

Issue £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 2.	Rise or Fall on Week.
122,577	Feb. 20	8	8	Blyth 5 p.c. Ord.	157½—158½	...
732,000	Feb. 20	3	3	Hartlepool G. & W. Cn. & New	70—72	...
2,061,315	Feb. 6	5	5⅛	Newcastle & Gateshead Con.	20/6-21/3a	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	88—89	+⅛
776,706	Dec. 19	3½	3½	Do. 3½ p.c. Deb. ...	87—89	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	101—103	...
332,351	Feb. 6	6	6	Sunderland 6 p.c. max. ...	132½—134½	...

NOTTINGHAM EXCHANGE

Issue £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 2.	Rise or Fall on Week.
542,270	Feb. 6	6	9	Derby Con.	132—137	...
55,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 19	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	103—108	...

SHEFFIELD EXCHANGE

Issue £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations June 2.	Rise or Fall on Week.
10,000	Feb. 6	10	10	Great Grimsby 'A' Ord. ...	180—190	...
6,500	,,	10	10	Do. 'B' Ord. ...	180—190	...
79,000	,,	10	10	Do. 'C' Ord. ...	175—185	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	137—140	...
95,000	Dec. 19	4	4	Do. 4 p.c. Deb.	100—102	...

a The quotation is per £1 of Stock.
* Ex div.

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